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AMBROSIA BEETLES IN FOREST AND SAWMILL

Their Biology, Economic Importance and Control

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THE prevention of pinhole degrade and associated fungal staining depends on the protection of green logs and unseasoned lumber from ambrosia-beetle attack. Various methods to achieve this object have been investigated over a considerable period of years and have met with differing degrees of success. Almost invariably, insufficient data have been collected on the biology of the ambrosia-beetle species whose control has been attempted. The methods employed to reduce or prevent ambrosia-beetle damage can conveniently be considered first for the standing tree and then for logs and lumber, and the latter under non-chemical and chemical methods.

FOR STANDING TREES

Girdling and Poisoning

No immunity from ambrosia-beetle attack is conferred on the timber if trees are killed before being felled; it is immaterial whether death is caused by girdling or by poisoning with Na arsenite poured into a frill-girdle or applied to the exposed cambium after ring-barking. In West Africa [106], Malaya [19], and Trinidad [103], poisoned trees have readily been attacked along the length of the bole. In the same regions, and also in the U.S.A. [63], girdled trees have proved very susceptible to attack, particularly in the region of the girdle.

Segregation of Fellings

In Trinidad, Swabey [103] has found that trees felled more than one mile from the nearest area under exploitation showed no reduction in intensity of attack, and similar results would probably be obtained in all tropical and temperate forests.

FOR LOGS AND LUMBER

(*a*) NON-CHEMICAL METHODS

Time of Felling

Beeson [10] has stated that in tropical forests there is practically no seasonal periodicity in the abundance of ambrosia beetles. It would certainly appear that there are always some species active

during each month of the year, but individual species do exhibit periodicity. Investigations recently undertaken in India in the Madras region by Khan [69], and in the Bombay region by Chatterjee and Chatterjee [32] indicate that the incidence of attack varies with the time of felling, among other factors; there was little or no attack on trees felled during the period October to April, whereas trees felled from May to September were heavily infested.

In temperate climates the relationship between time of felling and infestation of logs may be very pronounced owing to the dormant winter season. During an extensive investigation of ambrosia-beetle activity in Western Hemlock, conducted by Mathers [77] in the Coast region of British Columbia, one tree was felled every month over a period of 2 years, but the time of felling was found to have little effect on the ultimate susceptibility of logs to attack by 3 common species of ambrosia beetle, *Gnathotrichus sulcatus*, *Platypus wilsoni* and *Trypodendron cavifrons*. All logs were entered by *Gnathotrichus*, which appeared to prefer fresh timber, several logs being attacked within 1 week of felling. *Trypodendron* was at no time found attacking logs less than 5 months old. However, since in British Columbia no ambrosia beetles are in flight during the months October to March, logging can be carried on during this season with immunity, provided that the timber is removed from the forest not later than the first week in April.

Morley [81] has also studied this aspect in Eastern Canada and found that *Gnathotrichus materiarius* and *Trypodendron bivittatum*, which have an early flight period, both prefer logs of Balsam Fir, Pine and Spruce cut during the previous late summer and autumn to those from winter-felled trees. A comparison of these results with Mathers' shows that the two species of *Trypodendron* behaved similarly, but that the behaviour of *Gnathotrichus sulcatus* differed from that of *G. materiarius*.

Removal of Bark

Ambrosia-beetle attraction and infestation, as affected by the removal of the bark from green logs, appears to depend on such factors as the initial moisture content of the wood, the characteristics of the bark and the local climate. In general, barking of logs results in immediate attraction of ambrosia beetles and an initial high degree of infestation. This has been the general experience in West Africa [106], India [10; 69], Malaya [12; 15; 47], the Philippines [96], and Trinidad [103]. Unbarked logs, however, which dry out more slowly, may ultimately show higher degrade.

Browne [25] has recently described an interesting experiment in Malaya in which attack was compared on *Fagraea fragrans*, normally rather unattractive to ambrosia beetles, and *Shorea leprosula*, which is highly attractive. In that section of the test comprising unbarked logs, attack on *Shorea* was much heavier than on *Fagraea*, as was anticipated. In a comparison between barked logs, however, the relative intensity of attack was reversed and it would appear that the sapwood of *Fagraea* is in fact more attractive than that of *Shorea*, but that the attractant is usually masked by the *Fagraea*'s thick tough bark.

Holmes [61] states that in Ceylon unbarked logs of *Myristica dactyloides* are more heavily attacked than barked logs.

In North Queensland, Smith [99] has recommended that trees felled during winter should be barked immediately, thus causing a reduction in moisture content largely sufficient to protect them during the high beetle activity of summer. Logs from summer-felled trees do not become bark-loose and liable to infestation until the following winter, when insect activity is low.

Where degrade due to Cerambycid larvae is the predominant problem, barking is in any case advisable.

Squaring Logs

Beeson [10] and Swabey [103] have pointed out that ambrosia-beetle attack on squared logs is reduced in approximate proportion to the amount of sapwood removed during this operation. Nevertheless, as stated by Browne [27], sapwood is not essential for successful infestation, since in Malaya certain ambrosia beetles often bore directly into heartwood in sawn timber, rough-hewn logs and log-ends, and breed without difficulty under these conditions.

Water Storage

Storage in water is a recognized method of preventing infestation by ambrosia beetles on the submerged portions of logs; exposed surfaces may be freely attacked. According to Holmes [61] in Ceylon immunity is limited to the period of immersion and logs removed even after 6 months in water may be readily attacked. On the other hand, Roonwal [89] asserts that in India planks sawn from logs which have been stored in fresh running, or frequently changed, water are immune from borer attack.

Prompt Extraction

In theory, degrade due to ambrosia beetles can be forestalled by rapid extraction of the timber from the forest, followed immediately by conversion and drying of the lumber. This means of prevention has been stressed by Beal [7], Craighead [36], Graham [55], Keen [68], Swabey [103] and others. Unfortunately, this procedure is often uneconomic or otherwise impossible, even in temperate climates. In the tropics, ambrosia beetles may begin to enter the timber within 24 hours of felling, whereas extraction is often delayed, e.g. by roads becoming impassable during the rainy season, from 2 to 4 months.

Seasoning

Hopping and Jenkins [64] have studied the effect of kiln temperatures on ambrosia beetles in Western Hemlock lumber in Canada. They found that at a constant relative humidity of 80% all ambrosia beetles in material 3 in. thick were killed after 1½ hours at 150–160°, 2½ hours at 140°, and 9 hours at 120° F.

Vrydagh [109] has recently discussed the conditions under which exploitation takes place in the interior forests of the Belgian Congo and has recommended that, in order to minimize damage by ambrosia beetles to susceptible tree species, logs must be removed from the felling site to mill at the earliest opportunity and the sawn timber immediately dried artificially.

Similarly Mackay [76] emphasizes that ambrosia-beetle and stain damage to West African timbers may be prevented by rapid conversion and kiln seasoning, even in the most susceptible tree species, but that the sapwood will still be susceptible to powder-post borers (Bostrychidae and Lyctidae) on account of its starch content, and will require preservative treatment.

Johnston and Kowal [67] state that lumber in the U.S.A. may usually be protected if seasoned rapidly by end-racking for a few days; this will generally reduce the moisture content below that necessary for attack. Such a procedure, however, is not advisable with many species of wood because of their tendency to split and warp; it also necessitates extensive yard space and increases handling costs.

Trapping

Trap trees have occasionally been advocated to reduce the population of ambrosia beetles in areas under exploitation.

In the Cypress [*Taxodium*] forests of the South Atlantic and Gulf States of the U.S.A. it is customary to girdle the trees before felling, so that they may dry sufficiently to become floatable. Between the time of girdling and felling the trees often get so heavily infested by ambrosia beetles as to be rendered almost worthless. As early as 1907 Hopkins [63] suggested that Cypress trees of poor form should be felled in March, April, July and August to trap the injurious insect *Platypus compositus*, before girdling Cypress in the same locality. Trap trees should be immersed in water or otherwise destroyed within 2 to 3 months of the onset of attack. Smith [99] considers that the trap-tree method might be useful in North Queensland when virgin areas are about to be exploited intensively for a short period.

An interesting approach to the possibility of trapping ambrosia beetles has arisen from observations in recent years by Browne [27] in Malaya, suggesting that it is easier to attract the beetles than to repel or destroy them. In his paper Browne has suggested that a study of attractants may provide a better solution to the ambrosia-beetle problem than the pursuit of insecticides and preservatives. He considers it likely that the attractant is a product of fermentation, but this has not been proved. Anomalous results from creosoting unbarked and barked logs, where the former became heavily infested and the latter protected to some degree, are explained by Browne on the basis that creosote has a corrosive effect on bark, thus unmasking any attractant produced in the sapwood and rendering the log attractive. He suggests that creosote applied directly to the sapwood surface prevents, to some extent at least, the process necessary for the production of the attractant. Although the attractant-forming process and the nature of the attractant itself are unknown, Browne does give a number of clues on which a most interesting line of future work could be based. With more knowledge it may be possible to inhibit the production of the attractant by chemical means, or, using another approach, to create small and efficient trap billets which could accompany the timber from stump to saw, by baiting them with a strong attractant. These might well constitute a practical and economical solution to the ambrosia-beetle problem.

(*b*) CHEMICAL METHODS

During the last 30 years many chemicals have been tested for the prevention of ambrosia-beetle attack on green logs and lumber, but the majority have proved ineffective. Creosote was one of the first materials to give positive results, although, as already mentioned, the evidence has sometimes been

conflicting. Craighead [35] recommended it as a preventive in 1922 as a result of tests with numerous sprays, and it is still widely employed and recommended, particularly in Australia, e.g. for Mountain Ash in Victoria [37] and for Hoop Pine in Queensland [1]. More recently, in 1948, experiments in New South Wales [2] have indicated the possible effectiveness of a creosote spray against ambrosia-beetle attack on logs of Tulip Oak.

The past few years have witnessed considerable stimulus to research from the discovery of the powerful insecticidal properties of DDT and the γ isomer of BHC, as well as other organic compounds. A summary of the results obtained in various countries is given below.

U.S.A.

Christian [33] has investigated on a considerable scale the efficacy of treating hardwood timber by dipping and spraying. He tested approximately 100 formulations, of which 4 were found to be effective and 1 offered some promise of being applicable on a commercial scale. This solution, comprising 1 part of dichlorodiphenyl oxide in 3 parts of kerosene, has been widely employed in the prevention of ambrosia-beetle attack on green logs and lumber, but has not been entirely satisfactory, since the period of protection is only 1–2 months, the cost is high, and the repellent apparently cannot be readily adapted to lumber treatment.

In 1944 the Gulfport, Miss., laboratory of the Bureau of Entomology and Plant Quarantine initiated tests to determine the value of DDT against ambrosia beetles. After an exploratory period the tests were widened in 1946 to embrace BHC, methoxychlor, Toxaphene and other recently developed insecticides. Results for the period 1946–51 inclusive are contained in papers by Kowal [71], Johnston and Kowal [67] and Johnston [66]. Among the numerous chemicals and formulations tested, BHC has consistently proved so pre-eminent as a preventive in the warm humid climate of the Gulf Coast States for green hardwood logs and lumber, and Pine logs, that results warrant fairly detailed consideration.

Logs, (a) Preventive Treatment

Oil solutions. A concentration of ca. 0·5% γ BHC in No. 2 fuel oil is recommended for hardwood and Pine logs [65], giving good protection for 3–4 months during the season of greatest beetle activity. There is only a slight improvement in effectiveness if the γ isomer content is doubled from 0·5 to 1·0%. Sapstain may be prevented by incorporating 2% of pentachlorophenol. There are indications that the period of protection may be extended by the use of carriers more viscous and less volatile than No. 2 fuel oil, e.g. SAE 70 motor oil. Conversely, kerosene as a diluent appears to reduce the period of protection.

Tests with small billets have indicated that a No. 2 fuel-oil solution of BHC remains effective after submergence in running water for 6 weeks—of importance where logs are floated to the mill after treatment up-country.

Erratic results have been obtained on hardwood logs from a concentrated oil solution of BHC applied by mist blower. Fog machines have proved unsatisfactory.

Wettable-powder suspensions. In limited tests a suspension containing ca. 0·6% γ BHC in the form of a wettable powder has protected hardwood logs for 3–4 months. It is slightly cheaper than oil sprays.

Emulsions. Emulsions have proved inferior to oil solutions and wettable-powder suspensions; they afford protection for short periods only.

The spraying must be carried out as soon as possible after the trees are cut, preferably (to increase absorption) when the bark is dry. The degree of protection obtained depends largely upon the thoroughness of application. Oil solutions, wettable powders and emulsions of BHC must be applied until the entire bark of the log is dripping wet and also the ends; such thorough wetting requires at least 1 U.S. gal. of insecticide per 100 sq. ft. of bark. Successful treatment can be applied after the logs are stacked, provided that the method of stacking and the spray equipment employed enable the spray to reach the interior of the stack.

(b) Control Treatment

Oil solutions. In preliminary tests successful control has been obtained by dipping infested logs of 12 in. diam. for 5 minutes in an 0·5% solution of γ BHC in No. 2 fuel oil. Sprays of this formulation have proved ineffective.

Fumigation. Preliminary tests are claimed to have shown that broods of ambrosia beetles in logs can be killed by fumigation with MeBr. An airtight chamber equipped with some means of circulating the gas is necessary to obtain good results.

Lumber (*a*) *Preventive Treatment*

Emulsions. An emulsion containing ca. 0·1% γ BHC in water, applied by dipping, is favoured for the prevention of ambrosia-beetle attack on lumber. It is suggested that during long rainy periods it may be necessary to increase the γ isomer content. The emulsion is compatible with the commonly used sapstain preventives.

Concentrated solutions and dusts. Effective protection has been obtained with a solution of BHC at a concentration of ca. 0·3% γ isomer, applied from a mist blower at the rate of $\frac{3}{4}$ pint per 1000 bd. ft. of lumber, or a dust containing 10% γ isomer applied at the rate of $\frac{3}{4}$ lb. per 1000 bd. ft. These treatments can be applied after stacking.

Concentrated BHC solutions applied by fog machine have proved ineffective.

(*b*) *Control Treatment*

Oil solutions. In general the results are the same as for logs. A dipping period of considerably less than 5 minutes might suffice, but this has not been investigated.

Emulsions. These have not proved satisfactory.

Fumigation. Preliminary tests with MeBr have shown promise, but dosages and exposure periods have yet to be determined.

Canada

Recent successes with BHC sprays in the U.S.A. have prompted a small-scale field test on Vancouver Island, undertaken by Kinghorn and Webb [70] to find a diluent that will reduce the cost and fire hazard of treatment without loss of efficiency. The test, begun in July, comprised eight Douglas Fir of similar size whose boles were demarcated into eight 5-ft. sections, each separated by a 2-ft. buffer zone. Eight treatments were applied, using a Latin square experimental design. The analysis of the boles at the conclusion of the test (November) is shown in Table I [111]. A species of *Gnathotrichus* was responsible for all pinholes.

TABLE I (CANADA)

	Treatment	*Total no. of pinholes on set of eight 5-ft. sections*
A	Control	390
B	No. 2 fuel oil	542
C	BHC 0·4% + benzene in fuel oil	4
D	Me benzoate and Triton X-100 emulsion in water	471
E	BHC 0·4% with Me benzoate and Triton X-100 in water	17
F	Furfural and Triton X-100 in water	343
G	BHC 0·4% emulsion with furfural and Triton X-100 in water	12
H	Phenothiazine emulsion with Me benzoate and Triton X-100 in water	251

All the BHC treatments appear to be effective in reducing attack over a period of rather more than 2 months. It is interesting to note that the water emulsions were apparently as efficacious as the oil solution, despite moderate rainfall during the test.

French Guiana

In 1947, Floch [46] undertook laboratory tests with 5% DDT oil solution, 5% rotenone and 5% emulsion of *Mammea americana* in water, to compare their effectiveness against various Scolytid and Platypodid species in French Guiana. The DDT solution was the most successful, killing all beetles within 5 days of application. He next carried out small-scale field tests using susceptible tree species, and a 5% DDT oil solution was found to give complete protection against ambrosia beetles for at least 50 days.

French West Africa

In 1948, tests were initiated in the French Middle Congo using a combined insecticide/fungicide consisting of pentachlorophenol together with several other polychlorphenols and BHC dissolved in oil to give a concentrated solution and emulsified with water before use. Excellent protection against

ambrosia-beetle attack and fungal staining in test logs of *Terminalia superba* has been claimed for this preparation by Alliot [4] and Sallenave [90; 91]. Ten logs barked and treated within 24 hr. of felling were exported to France 2 months later and analysed on arrival. The intensity of ambrosia-beetle attack varied from 0·3 to 6·5 entrance tunnels per sq. ft., and the depth of penetration did not exceed 2·4 in. Attack by fungi, both laterally and on the ends, was negligible.

In another test 8 logs were treated 2 months after felling, by which time they had become heavily infested with ambrosia beetles. These logs, together with a control log, were later sent to France and analysed on arrival. Five of them averaged between 1 and 3 pinholes per sq. ft. and the other three between 12 and 18. The depth of penetration was seldom more than 2 in. since the great majority of the beetles had been killed at the time of treatment. Fungal attack was almost negligible. The combined loss due to insects and fungi was estimated to be 0·3% by volume. The untreated control averaged ca. 47 pinholes per sq. ft., these penetrating nearly to the centre of the log. Moreover, the wood was rotten to a depth of 20–24 in. at the ends and to a depth of 4 in. on the sides. Insect and fungal degrade had together rendered the log valueless.

In the above tests the insecticide/fungicide was used as either a 20 or 40% emulsion.

Further investigations* with the same preparation were carried out in the French Cameroons by Alliot and Ivanès [5] to determine treatments suitable for other susceptible timbers in tropical climates. The following general conclusions were reached:

(i) The preservative should be applied within 48 hr. of felling and cross-cutting.
(ii) The emulsion should consist of 1 part preservative to 2 parts water, i.e. a 33% emulsion.
(iii) Application should be by spray, or, in special cases, by dipping.
(iv) Tree species with rough bark, or from which the bark is easily removed, should be barked before treatment.
(v) Logs should be turned to ensure complete coverage.
(vi) After treatment, logs should not be moved for 2 hours.
(vii) The spray equipment should be strong but light and have no natural rubber components. Plastic or aluminium is preferable to copper or brass.
(viii) A second application of preservative may be necessary before export. Dipping is best.

Gold Coast

Preliminary tests with DDT and BHC were made in the high-forest zone of the Gold Coast in 1948–9 by one of the authors [45]. The stock solutions of DDT and γ BHC were 14% oil concentrates, with kerosene as diluent. In addition P 520, a water-miscible BHC powder containing some 6·5% of the γ isomer, received one trial.

The test timber was Chenchen (*Antiaris africana*), in the form of six 6-ft. logs, barked and unbarked, treatments being carried out immediately after felling and cross-cutting.

TABLE II (GOLD COAST)
BHC—OIL SOLUTIONS
Duration of Test—5 weeks. Dry Season: rainfall negligible.

Treatment	*Period of immunity in weeks*		*Pinholes per sq. ft. after 5 weeks*	
	Barked	*Unbarked*	*Barked*	*Unbarked*
1·0% BHC	2	2	1·9	1·6
0·5% BHC	1	5	7·2	Nil
Control	Nil	2	96·6	16·4

Both concentrations gave a very limited protection to barked logs: the results for unbarked logs were inconsistent. Pinhole degrade was, however, considerably reduced on both log-types at each concentration.

* The following paper, published since this article was written, describes in detail recent important investigations for the protection of logs from felling site to sawmill in the French Cameroons.
Alliot, H. (1953). Recherches sur la protection des bois en grumes sous les climats tropicaux. *Bois. For. Trop.* No. 30 (43–52).

TABLE III (GOLD COAST)

BHC AND DDT—OIL SOLUTIONS

Duration of Test—8½ weeks. Dry Season: rainfall negligible.

Treatment	*Period of immunity in weeks*		*Pinholes per sq. ft. after 8½ weeks. Pre-conversion*		*Pinholes per sq. ft. after 12 weeks. Post-conversion*	
	Barked	*Unbarked*	*Barked*	*Unbarked*	*Barked*	*Unbarked*
5·0% BHC	8½	8	Nil	17	Nil	2·5
2·0% BHC	2	4	5	8	Nil	10
5·0% DDT	Nil	3	49	7	73	98
2·0% DDT	Nil	Nil	64	100	64	109
Control	Nil	2	45	3*	77	1

* Occasionally, unbarked control logs remain green and free from ambrosia-beetle attack for a considerable period.

Assessment in the forest was made by means of six 6 in. sq. quadrats systematically arranged, 2 on the upper and 2 on each lateral log surface, approximating to a 5% sample. The logs were then extracted to mill and converted into 4-in. slabs. The number of pinholes was counted on a 25% sample of one face of each centre slab.

DDT was ineffective on either log-type at both concentrations. BHC, even when the period of complete protection was short, gave a low final intensity of attack. Barked logs were better protected.

TABLE IV (GOLD COAST)

BHC—OIL SOLUTIONS AND WATER SUSPENSIONS

Duration of Test—16 weeks. Rainy season: heavy rainfall.

Treatment	*Period of immunity in weeks*		*Pinholes per sq. ft. after 16 weeks*	
	Barked	*Unbarked*	*Barked*	*Unbarked*
Oil solutions				
2% BHC	6	16	12	Nil
1% BHC	4	12	32	6
0·5% BHC	Nil	4	66	183
Water suspensions of P. 520				
1% BHC	3	6	14	61
0·5% BHC	Nil	6	21	46
0·25% BHC	1	2	23	51
Control	Nil	Nil	135	1
Control	Nil	Nil	36	48

BHC at 1 and 2% γ isomer gave complete protection to unbarked logs for 3 and 4 months respectively. P 520 at concentrations of 0·5 and 1% γ BHC gave complete protection to unbarked logs for 6 weeks, which is very satisfactory in view of the season of year. Barked logs were attacked first under all treatments but ultimate intensity of attack was higher on the unbarked logs.

These preliminary experiments in the Gold Coast indicate that DDT does not appreciably prevent attack by ambrosia beetles, whereas BHC applied as an oil solution at a concentration of at least 2% γ isomer may afford reasonable protection for about 8 weeks. Water-miscible BHC powder (P 520) may prove very effective during the dry season: a concentration of 1% γ isomer would probably be required, although lower concentrations may prove satisfactory for periods of a few weeks.

Malaya

Several preparations were tested by Browne [23] in Malaya in 1949. BHC alone showed appreciable toxicity to ambrosia beetles. DDT was given one trial at 14%, but even this high concentration afforded no protection; pentachlorophenol and related compounds were also ineffective. BHC was tested as a 14% oil concentrate, diluted to the required strength with kerosene, and also in the form

P 520. Unbarked billets of *Shorea leprosula* were used, these being barked after each test, to facilitate pinhole counting.

Oil solutions of 1·1% γ BHC and less gave no apparent protection. Results with 1·75, 2, 2·5, 3 and 3·5% γ BHC oil solutions are shown in the following Tables V-VI.

TABLE V (MALAYA)

BHC—OIL SOLUTIONS

Duration of Test—4 weeks. Rainfall: 7·6 in., mostly in 2nd and 3rd weeks.

Pinholes per sq. ft. (mean of 3 logs)			
Controls	*1·75% BHC*	*2% BHC*	*2·5% BHC*
5·09	0·90	0·59	0·55

The means of treatments are significantly less than that of the controls, but there is no significant difference between treatments. However, species that attacked all three treatments were alive only in the 1·75 and 2% billets.

TABLE VI (MALAYA)

BHC—OIL SOLUTIONS

Duration of Test—8 weeks. Rainfall: 14 in., fairly evenly distributed.

Pinholes per sq. ft. (mean of 3 logs)			
Controls	*2% BHC*	*3% BHC*	*3·5% BHC*
0·44	0·33	0·04	—
As above but ca. 7 in. rainfall in 2nd and 3rd weeks			
0·68	—	—	Nil

The 2% solution gave no protection. It is stated that the 3% solution probably gave complete protection for 6 weeks. Concentrations of 3·5, 4 and 5% γ BHC oil solutions all gave complete protection for eight weeks.

It is concluded that to obtain complete protection against ambrosia beetles for 2 months in the moist tropical climate of Malaya, a minimum concentration of 3–3·5% γ BHC in oil solution is required.

A concentration of 12 oz. of water-miscible BHC powder per gal. of water (ca. 0·5% γ isomer) gave no protection. At 1 lb. per gal. (ca. 0·65% γ isomer) complete protection was obtained during 4 weeks of dry weather, but rainfall then permitted infestation. P 520 will apparently require to be in combination with an efficient sticker for use in the wet season. Browne did not find Na silicate entirely satisfactory for this purpose, but since this is a highly alkaline material some chemical decomposition of the BHC may have taken place.

In 1951 Browne [26] carried out a field test using chlordan as a 5% emulsion on logs of *Shorea leprosula*, but this afforded no protection.

Australia

The New South Wales Forestry Commission Division of Wood Technology are investigating the prevention of ambrosia-beetle attack in logs and green lumber, using the more recent repellent insecticides, principally BHC, but no results have been published to date.

FINANCIAL ASPECTS OF CHEMICAL CONTROL

The type of data required to determine whether chemical methods of preventing ambrosia-beetle attack are justified on financial grounds has been discussed for Malaya by Browne [24]. There is pressing need for accurate costings of material and labour in control operations, and also for data on loss in timber value when no prevention is attempted: this will vary widely according to species of beetle and timber.

In the successful treatment of *Terminalia superba* in the French Middle Congo, Sallenave [91] states that the cost of treatment did not exceed 1·17% of the value of good-quality logs, this small additional charge being divided equally between cost of chemical and labour.

In the U.S.A. tests conducted by Johnston [66], using BHC, logs were protected at a cost for chemical of \$1·-\$1·25/1000 bd. ft. (oil solution), or \$0.85/1000 bd. ft. (wettable powder) for logs 14–16 in. diam.; larger logs would of course come proportionately cheaper. For lumber, costs per 1000 bd. ft. were \$0.32 for emulsions and \$0.25 for concentrated solutions and dusts. Labour costs are not given.

Kowal [71] quotes the following costs for materials, in treatments using BHC: logs from \$0.45 (2½ ft. diam.) to \$1.30 (1 ft. diam.) for oil solutions, and \$0.25 to \$0.75 for emulsions, per 1000 bd. ft. Lumber sprayed or dipped with emulsion, or treated by fog machine, cost \$1.50 per 1000 bd. ft.

Summary of Prevention and Control

Existing evidence indicates that neither girdling or poisoning trees before felling nor the segregation of felling operations, confers immunity from attack. In some countries, however, the organization of exploitation, particularly with reference to time of felling and speed of extraction from stump to mill, may be expected to eliminate or greatly reduce the ambrosia-beetle hazard, although in tropical countries peculiar difficulties derive from the rapid onset of attack following felling. Neither barking nor squaring can be considered solutions. In the case of lumber, however, effective means of prevention and control are available: rapid seasoning by end-racking or kilning will prevent infestation and terminate it if already present. The use of attractants offers an interesting field of study: a billet coated with an attractant and accompanying the log from felling site to destination would be a practical and probably economical method of protection.

Most chemical treatments investigated for preventing attack on green logs and lumber have failed. The outstanding exception is the γ isomer of BHC, particularly in an oil solution, although for short periods water suspensions show promise. DDT has given erratic and generally unsatisfactory results. More information is required, especially from the tropics, to permit an adequate assessment of the economic aspects of chemical control.

Conclusions and Future Developments

Whilst the foregoing review records recent and substantial progress in the control of ambrosia beetles, it reveals many gaps in knowledge of their biology and in particular of the conditions essential for their attraction to and development in trees and logs. With some notable exceptions—in Malaya, for instance, where Browne's work is an outstanding contribution to knowledge of these insects in the tropics—comparatively little attention has been given to such matters although of fundamental importance. Until further data on the insects themselves, particularly in the tropics, are forthcoming, control must depend largely upon "hit and miss" methods of treatment with varying results and little guarantee of consistent success. In West Africa, where Mackay [75] drew attention to the need for such investigations, their urgency has meanwhile become all the more pressing [3; 44]. Following a programme of investigation outlined by the Forest Products Research Laboratory, Princes Risborough, a small Timber Borer Research Unit of three biologists was set up in January 1953 by the Colonial Office and the Governments of the Gold Coast and Nigeria, to implement this programme, working in collaboration with the Laboratory. A unique opportunity has thus been afforded of carrying out carefully planned investigations in West Africa on all aspects of the ambrosia-beetle problem. A brief summary of the work envisaged may be of interest to other countries where these insects are important pests.

The immediate need for palliative measures against infestation demands continued attention to the development of improved insecticide treatments on the lines of past work in the Gold Coast and Malaya, but sound progress is dependent upon increased knowledge of the habits of the insects. For this reason it is considered essential that the investigations summarized below and designed to acquire basic entomological and ecological data, should take precedence over further work on insecticides, but it should be possible for both types of work to run concurrently:

(*a*) General survey of the problem, including collection of data on comparative susceptibility to attack of trees and logs of different species; collection, identification and biological studies of the insects concerned.

(*b*) Determination of effect of seasonal climatic variations, altitude, silvicultural conditions and locality factors; of methods of timber handling, extraction and storage, with particular reference to moisture content and presence or absence of bark.

(*c*) Elucidation of the factors determining attractiveness of trees and logs to ambrosia beetles, and the conditions governing suitability for inoculation and growth of ambrosia fungi.

(*d*) Investigations on the development and control of staining and decay due to fungal attack in relation to infestation by ambrosia beetles and by bark beetles.

The development of work on a similar scale in other parts of the Commonwealth may not at present be practicable, but even in the absence of specialist officers much can be done by Forest Departments and timber firms to alleviate the borer problem and contribute to general knowledge of the insects concerned and methods of their control. The view that the forest officer is not directly concerned with defects that do not become apparent until after the felling and conversion of his trees, is no longer tenable in the light of increasing evidence of attack in standing trees and of the frequency of infestation in logs before they reach the sawmill. His contribution to the work may best be summarized in Browne's [12] apt words: "The description of insects and the maintenance of a collection take a considerable amount of time and district forest officers need not bother their heads about it. What is needed are careful records and specimens, or even general notes, and here it should be remembered that it may be as important to note absence of borers as their presence."

Such co-operation by forest officer and timberman, well exemplified by recent work in Canada [53], supplementing detailed investigations by specialist officers, would ensure a great reduction in the damage and losses caused by ambrosia beetles throughout the world.

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(*Reprints of the above article are available from Central Sales Branch, Commonwealth Agricultural Bureaux, Farnham Royal, Bucks., England, at 2s. 6d. each.*)

EDITORIAL NOTE

(1) *Translations*

For the convenience of readers, references will in future be given at the head of the Abstract Section to all translations noticed in that issue.

(2) *Classification*

During the past year the Joint FAO/IUFRO Bibliography Committee has considered a number of proposals for the improvement of the Oxford System of Decimal Classification for Forestry and recommended the adoption of certain amendments, notably in the comparatively new subject of work science. The system, with the Committee's amendments, was unanimously approved by the plenary session of the Congress of the International Union of Forest Research Organizations at Rome, Sept. 1953, and this approved text—the definitive English text—will be used in *Forestry Abstracts* from this issue on. In most cases, the amendments and extensions are so slight that the titles of sections and the position of abstracts are unaffected: the attention of readers is, however, drawn to the rearrangement under section 3 whereby the former section 35 (work studies) has been distributed over the three new sections 30, 35, and 36. In section 8 it may be noted that composite materials such as fibre- and chip-boards are now classified at 862 (the former subject matter of 862 being merged in 861), and that a new head 88 has been taken up for questions of economy in the use of wood and the replacement of wood by competitive materials.

Forestry Abstracts, Vol. 15, No. 1

ABSTRACT SECTION

0. FORESTS, FORESTRY, AND THE UTILIZATION OF FOREST PRODUCTS: GENERAL

For general *regional* accounts see section 90

TRANSLATIONS

See Nos. 328, 623–4, 632, 720–1, 725–6, 736, 768, 803.

0 (048.1). BIBLIOGRAPHICAL LISTS

See Nos. 360, 592.

0 (05). PERIODICALS

See also No. 727.

1. ***Forestry Abstracts* coverage list: periodicals and series.** *FAO For. For. Prod. Stud.* No. 7, 1953. pp. 180. Price US $1·50 or 7*s.* 6*d.*

Consists of 2 lists—(1) Periodicals and serial publications read regularly for the production of *Forestry Abstracts*. (2) Periodicals and series from which abstracts are occasionally made. Both lists are arranged geographically and there are also a consolidated index of periodicals and a geographical index.

0 (058). ANNUALS. YEARBOOKS. DIRECTORIES

See Nos. 92, 1017, 1019.

0 (084.3/4). MAPS AND ATLASES

See Nos. 26, 408, 420, 423–4, 483, 1011.

0 - - 011. TERMINOLOGY. NOMENCLATURE

See Nos. 109–10, 114, 122–4, 157, 346, 426, 806.

0 - - 015. MATHEMATICS. STATISTICAL METHODS

See also section 5.

2. SCHAEFFER, L., *et al.* La méthode statistique et ses applications en matière forestière. **[Statistical method and its applications to forestry.]** *Rev. for. franç.* Special Number, Aug., 1953. pp. 80. 19 refs. [F.]

A special number devoted to a series of articles by the late Léon Schaeffer, on statistical theory and methods as applied to forestry, with additional commentaries and notes by *L. Brenac* and *A. d'Alverny*.

0 - - 019. MISCELLANEOUS RESEARCH METHODS [INCLUDING PHOTOGRAPHY]

3. [NORONHA, R. C. V. P.; LAURIE, M. V.] **Comments on forest photography.** *Indian For.* 79 (7), 1953 (399–402).

Notes on the taking of photographs in the forest, in the form of comment on an article by C. E. Hewetson. [Cf. *For. Abstr.* 13 (No. 1978).]

4. TOULGOUAT, P. La photographie en forêt. **[Photography in the forest.]** *Rev. Bois Appl.* 8 (2), 1953 (17–23). [F.]

Gives practical advice and hints for taking [monochrome] photographs in the forest, including size of film, choice of objective, emulsion (film) type, and exposure.

0 - - 087. APPARATUS, INSTRUMENTS, MACHINERY: GENERAL

In this and future issues the literature formerly classified here will be found at 307.

11. SITE FACTORS: CLIMATE, SITUATION, SOIL, HYDROLOGY (WATER AND SOIL CONSERVATION)

111. *The Atmosphere. Meteorology. Climate and Microclimate*

111.1. Composition, Structure, Mechanics and Thermodynamics of the Atmosphere in General

5. SILVA, Q. G. PINTO DA. Análise polínica do ar em Sacavém nos anos de 1949 e 1950. **[Pollen analysis of the air at Sacavém in 1949 and 1950.]** *Portug. Acta biol.* 3*A* (3), 1952 (261–74). 27 refs. [Port.e.] O.B.D.

Samples were taken in this suburb of Lisbon by exposing paraffin-coated slides. A graph is presented showing the distribution of pollen, by species or family (including those of trees) throughout the year.

111.2. Radiation and Temperature

See Nos. 7, 15.

111.7. Humidity, Evaporation, Precipitation

See also No. 7.

6. HOWELL, W. E. **Forests in relation to rainfall.** *Pulp Paper Mag. Can.* 54 (6), 1953 (212 . . . 218). 8 refs. (*Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 1310 (*F*–1).)

A brief review of literature on the direct effects of rainfall on forests, the effect of forests on rainfall, and rainfall stimulation by cloud seeding.

111.8. Climatology. Climate and Microclimate

See also Nos. 36, 174, 284 *et seq.*

7. MAŘAN, B., and LHOTA, O. Mikroklima a povrchové odtoky na rašeliništi a v lese. **[Microclimate and run-off on a peat bog and in forest].** *Sborn. čsl. Akad. zeměd.* 26*B* (4), 1953 (1–78). 72 refs. [Cz.russ.g.] C.G.B.

A detailed report on studies [partially covered by a shorter previous paper—cf. *For. Abstr.* 14 (No. 955)] made in 1949–51 on a partially drained plateau bog over impermeable gneiss (alt. ca. 1050 m.) in the S. Bohemian mountains. The area has a cool, very humid mountain climate and is covered with (*a*) open *Calluna* moor, (*b*) Norway Spruce forest and (*c*) stands of Mountain Pine (dwarf, elfin-woodland type). Data are presented on air temperatures at 30 cm. above ground, soil temperatures at 1 m. depth, relative humidity, precipitation, evaporation (measured with Ron and Piché evaporimeters), and water levels in a flume constructed at the outflow of the bog and in 8 wells in the bog itself.

Considerable differences in air temperature were found between the 3 habitats, especially in spring and summer: the highest mean annual temperature occurred in (*c*) and the lowest in (*b*), with a difference of 1·39° C.; (*c*) was also the earliest in warming up in spring and enjoyed the greatest number of frost-free days. Since the climate is cool and late frosts are frequent, these facts emphasize the value of Mountain Pine in afforestation, as a nurse for more sensitive species [cf. *For. Abstr.* 14 (No. 955)]. In general, it appears that as compared with the open bog, the start of the growing season is ca. 14 days earlier under Mountain Pine and 14 days later under Norway Spruce.

The mean annual soil temperatures at 1 m. were higher for all 3 habitats than those of the air, and differed very little among themselves. At this depth the soil was never frozen, even on the open moor. The minima occurred in March–April and maxima in August. From autumn to early spring, soil temperatures were lowest in (*b*) and highest in (*c*); in later spring and summer both (*b*) and (*c*) were cooler than (*a*).

Differences of relative humidity between the 3 habitats were not large and are probably not important biologically.

Run-off was governed by the degree of water saturation of the peat. In periods when the peat was saturated to the surface, large variations occurred and the least amount of rain was followed by a quick rise in stream-flow. At other times, stream-flow was very stable, owing to the great water-storage capacity of the peat.

114. *Soil. Soil Science*

114.1. Soil Physics

See also Nos. 31, 38, 287.

8. 'Protocoles d'analyses des sols tropicaux. **[Correct procedures for the analysis of tropical soils.]** *Agron. trop.* 8 (3), 1953 (307–23). [F.]

The Technical Section of Tropical Agriculture of the Ministère de la France d'Outre-Mer has formulated standard procedures to be used in the physical and chemical analysis of tropical soils in order to facilitate the comparison of data from different areas. These are described in detail.

9. **Soil moisture measurement with the fiberglas instrument.** *Occ. Pap. Sth. For. Exp. Sta.* No. 128, 1953. pp. 48. 23 refs.

Contains the following papers: Comparison of 4 types [plaster of Paris block, fibreglass, nylon, and fibreglass/plaster of Paris combination] of electrical resistance instruments for measuring soil moisture (*E. H. Palpant* and *H. W. Lull*); An inserter for fibreglas soil-moisture units (*E. H. Palpant*); Switch shelters for use with soil-moisture units (*E. H. Palpant, J. L. Thames* and *A. E. Helmers*); Moisture equilibration in natural cores during laboratory calibration of fibreglas soil-moisture units (*C. A. Carlson*); and Installation and field calibration of fibreglas soil-moisture units (*K. G. Reinhart*). The papers are based on work by the Vicksburg Infiltration Project, U.S. Forest Service.

10. Broadfoot, W. M. **Moisture in hardwood forest floor.** *Sth. For. Note Sth. For. Exp. Sta.* No. 85, 1953 (3–4).

Moisture studies at Vicksburg, Mississippi, during the summer of 1952 showed that a hardwood forest floor (organic debris down to mineral soil) of 1-in. average depth, lost within 5 days after light showers 95% of its moisture. The storage capacity of the floor was 0·12 in. of water. Throughout the summer the moisture content never exceeded 50% of storage capacity, but it may be assumed that it would reach 90–100% in winter. The change in forest-floor m.c. after rain was affected by the length of time the floor had been dry. A fall of 0·1 in. after a dry period of 2 weeks or more, added water equivalent to about 12% by storage capacity, but following a shower 5 days earlier, added water equivalent to 45%.

11. Gaiser, R. N. **Readily available water in forest soils.** *Proc. Soil Sci. Soc. Amer.* 16 (4), 1952 (334–8). 10 refs. L.S.

A record was kept for a year of soil moisture in 3 Oak forest areas in the Zaleski State Forest, Ohio. Soils represented were (1) Wellston silt loam, (2) Muskingum loam, and (3) Zaleski loam. Moisture losses from the soil through transpiration and evaporation throughout the 1951 growing season were 13, 12 and 23 in. for (1), (2) and (3) respectively. It is thought that evaporation losses from the soil itself are small, and that total losses approximate closely to the amount of water lost by transpiration. Utilization of water is complete on moist sites, and Oak forests are probably capable of transpiring more than is ordinarily available. The growth rate of *Quercus alba* is much more rapid on the Zaleski loam than on the other soils.

12. Gaiser, R. N. **Root channels and roots in forest soils.** *Proc. Soil Sci. Soc. Amer.* 16 (1), 1952 (62–5). L.S.

The vertical channels formed in the soil through the decay of the roots of hardwood trees were studied on a site in south-eastern Ohio. Data were obtained by exposing the soil profile through trenching, and by probing with a flexible wand to find regions of low resistance. The number of vertical channels found exceeded 4000 per acre, but this estimate is probably low, because not all channels could be discovered by the methods used. The channels are probably interconnected by lateral ones. Because the channels contain material relatively more permeable to water than the surrounding soil horizons, they probably serve as pathways for the rapid movement of a large part of the free water in the soil profile. It is probable, therefore, that estimates of the physical and hydrological characteristics of forest soils will be seriously in error, unless some allowance is made for the discontinuities in the soil profile resulting from the decay of taproots and their laterals. *From author's summary.*

13. Harley, J. L., and Brierley, J. K. **A method of estimation of oxygen and carbon dioxide concentrations in the litter layer of Beech woods.** *J. Ecol.* 41 (2), 1953 (385–7). [Department of Botany, University of Oxford.]

14. **Soil-freezing studies.** *Rep. Ntheast. For. Exp. Sta. 1951*, 1952 (36–8).

The following conclusions are drawn after analysis of observations during the winter of 1950–1 on a number of plots: concrete frost is deeper and lasts longer: (1) on abandoned agricultural lands without natural regeneration than on those with good regeneration; (2) in 20-year than in 30- to 35-year coniferous plantations; (3) in coniferous than in hardwood stands; and (4) in stands where the forest floor has been disturbed by fire, logging or grazing than in undisturbed stands, the amount of concrete frost being directly related to the amount of disturbance.

15. Baumgartner, A. Das Eindringen des Lichtes in den Boden. [**The penetration of light into the soil.**] *Forstwiss. Cbl.* 72 (5/6), 1953 (172–84). 13 refs. [G.]

Results of studies for different types of soil, and the influence on such penetration of humidity, ray length, and the particle size, light-reflecting power and stratification of the soil.

114.2. Soil Chemistry

See also Nos. 8, 19–21, 181

16. Süchting, H. Untersuchungen über die Nährstoffgehalte einiger Quellwässer in Waldböden. [**Research on the nutrient content of some springs in forest soils.**] *Z. Pflanzenernähr. Düng.* 61 (3), 1953 (212–20). 4 refs. [G.g.] O.R.S.

Measurements were made over a year at intervals of 4–6 weeks of the contents of N, K_2O and CaO in 13 springs and streams in the Hannoversche Münden forest area. Results are tabulated. On the basis of these results, and calculating the annual rate of water infiltrating to the ground water as 200–250 mm. of the annual precipitation, the average annual loss of nutrients/ha. by leaching is calculated as: N 2–2·5 kg., K_2O 4–5 kg., CaO on sandstone 25–75, and on limestone 250–450 kg.

17. Wilde, S. A., Trach, J., and Peterson, S. F. **Electro-chemical properties of ground water in major types of Wisconsin organic soil.** *Repr.* from *Proc. Soil Sci. Soc. Amer.* 14, 1949 (1950), (279–81). 8 refs.

Presents the results of analyses of ground waters in (1) moss peat, (2) wood peat, (3) muck, and (4) sedge peat soils.

114.3. Soil Formation. The Soil Profile and its Development. Litter, Humus etc.

See also Nos. 10, 13, 16, 38, 350, 357.

18. Święcicki, K. Liczbowe określenie stopnia zadarnienia gleby leśnej. [**Numerical determination of the degree of sod formation in forest soil.**] *Sylwan* 97 (2), 1953 (145–8). 5 refs. [Pol.]

Sod is defined as the top soil-layer bound together by the living, all-aged rootlets of the ground vegetation. Sod thickness is measured from the plane passing through the root-collars of the vegetation to the plane below which the rootlets do not bind the soil. The volume of sod is $D = g + k + p$, where g is the volume of the solid soil particles, k that of rootlets, and p that of the space filled with

water vapour and gases. The degree of sod formation is given by the ratio k/D. The value of k is easily determined by means of a xylometer; D is determined for an area 1 m. square, and a conventional thickness of 0·2 m., this depth being of importance for the initial period of growth of plants and seedlings. Hence the degree of sod formation is $Z = k/0{\cdot}2 = 5k$. The author uses the following classes: very intense $Z = 0{\cdot}46$ or more, intense 0·21–0·46, medium 0·11–0·20, and weak 0·01–0·10. Besides the degree of sod formation, it is necessary to mention the % occurrence of rootlets of particular species.

19. WALLACE, W. R., and HATCH, A. B. **The effect of leaf litter on surface soil properties of the Jarrah [*Eucalyptus marginata*] forest.** *Aust. For.* 16 (1), 1952 (35–42). 5 refs.

The amount of litter deposited in 3 types of Jarrah forest [virgin, pole, and sapling] during 1951 varied between 36 and 47 cwt./acre. The litter fall was not evenly distributed throughout the year, but reached a definite maximum in January, February, and March. Data are presented showing the amount of the more common inorganic constituents occurring in the leaf litter, and the amount of nutrients returned to the soil per acre per annum through leaf fall. The surface soils of the Jarrah forest have high organic C values but very low total N values, with consequent high C/N ratios. The cation exchange capacity of the surface soils is largely influenced by the amount of organic matter present. *From authors' summary.*

20. METZ, L. J. **Weight and nitrogen and calcium content of the annual litter fall of forests in the South Carolina Piedmont.** *Proc. Soil Sci. Soc. Amer.* 16 (1), 1952 (38–41). 12 refs. L.S.

Annual litter fall was measured in (1) Pine, (2) mixed Pine/hardwood, and (3) hardwood stands. Total amounts dropped (including twigs, bark and fruit) ranged from 4059 to 5619 lb./acre p.a. (oven-dry). Estimating leaf litter alone, the annual amount ranged from 2938 lb./acre in a 30- to 40-year-old stand of *Pinus echinata* to 4476 lb. in a 25-year-old *P. taeda* stand.

The content of N, Ca, and Mg in freshly fallen leaves was determined for 14 tree species. The foliage of both *P. taeda* and *P. echinata* contained less of these elements than any of the hardwood species. Hardwood stands return twice as much N, 3 times as much Mg, and 5 times as much Ca, to the forest floor in their litter as do the Pine stands. Data on the nutrient content of common forest species and the litter fall of representative stands can be used by the forester to evaluate the effect of his management practices upon soil conditions.

21. WINTER, A. G., and BUBLITZ, W. Untersuchungen über antibakterielle Wirkungen im Bodenwasser der Fichtenstreu. **[Research on the anti-bacterial effect of Spruce litter on soil water.]** *Naturwissenschaften* 40 (12), 1953 (345–6). 5 refs. [G.] O.R.S.

[Cf. *For. Abstr.* 14 (No. 2981).] An investigation was made of the effect on the bacteria in compost and a peat/compost mixture, of a sterilized Spruce litter extract, evaporated to $\frac{1}{10}$ of the original solution (4000 c.c. distilled water/1000 g. dry litter) and diluted to different concentrations. The highest concentrations completely prevented germination of the microflora in compost, gave germination of 142% compared with controls at a concentration of 1 : 4, and had no effect at concentrations of 1 : 16 and below. The microflora in the peat/compost mixture was less affected, only 75% inhibition of germination occurring with the highest concentrations. These results were irrespective of pH values.

22. HOOVER, M. D., and LUNT, H. A. **A key for the classification of forest humus types.** *Proc. Soil Sci. Soc. Amer.* 16 (4), 1952 (368–70). 5 refs. L.S.

Basic criteria in the classification presented are: (1) The presence or absence of an H layer, (2) the degree of incorporation of organic matter into the upper mineral soil layer, and (3) the structure, thickness and organic-matter content of the H layer and/or the A_1 horizon.

114.4. Soil Classification. Soil Types

See also No. 186.

23. HAYASHI, S., and SHIMOIDE, A. **[Soils of the Ogawa National Forest.]** In *Forest Soils of Japan, Report 3*, Government Forest Experiment Station, Meguro, Tokyo. 1953. pp. 1–53. 21 refs. [Jap.e.]

Surveys the soils and their vegetation and recommends suitable species for the different types. [Cf. *For. Abstr.* 14 (Nos. 2990–1).]

24. MURAMATSU, Y., WATANABE, T., and SATO, Y. **[Soils of the Tagata National Forest.]** In *Forest Soils of Japan, Report 3*, Government Forest Experiment Station, Meguro, Tokyo. 1953. pp. 55–75. 11 refs. [Jap.e.]

Recommends suitable species for the different types of soil distinguished. Tables and illustrations have English legends.

25. KOBATA, H., KIZAKA, T., and WATANABE, T. **[Soils of the Kamo National Forest.]** In *Forest Soils of Japan, Report 3*, Government Forest Experiment Station, Meguro, Tokyo. 1953. pp. 77–119. 6 refs. [Jap.e.]

Surveys the soils and their vegetation and recommends suitable species for the different types. Illustrations and tables have English legends.

26. **[Forest soils of Japan. Report 3. Soil maps: Ogawa (Nagano 1): Tagata, Kamo (Tokyo 2, 3).]** Government Forest Experiment Station, Meguro, Tokyo. 1953. 2 maps. [Jap.]

Contains 2 soil maps, scale 1 : 20,000, illustrating papers on the forest soils of the 3 districts. [Cf. preceding abstracts.]

27. STRZEMSKI, M. Problem typologii górskich gleb leśnych. **[Types of mountain forest soils.]** *Sylwan* 97 (1), 1953 (3–11). [Pol.]

Gives definitions of podzols and brown forest soils, and a brief outline of their formation, mostly based on Soviet theories. The author believes that, in the formation of brown soils, the major part is often played not by water circulating deep in the soil but by the water that leaches out the podzol-forming humic acids from the top layer. Although

brown soils can occur on sites of various relief, they are found on mountains in colder and more humid conditions than those of their lowland range. Analysis of Polish forest soils reveals 3 types: brown soils proper; pseudo-brown soils; and podzols proper. The brown soils proper are associated with broadleaved (and some mixed) forests; they are characterized by a high pH, low Ca removal and low decomposition of silicates, and by continuous circulation of Mg, Fe, Al, and Mn. The pseudo-brown soils accompany the brown soils proper under mixed forests, and they preponderate under conifers. They have medium or low pH, considerable or complete Ca removal, Mg often leached out, and circulation of Fe, Al, and Mn. Morphologically they resemble the true brown soils. Podzols occur under coniferous forests on some mountain sites and are characterized by high acidity, decalcification, advanced decomposition of silicates, accumulation of Mg, Fe, Al and Mn in the lower horizons, with a relative enrichment of the top layers in SiO_2.

28. Williams, B. H., and Bowser, W. E. **Gray wooded soils in parts of Alberta and Montana.** *Proc. Soil Sci. Soc. Amer.* 16 (2), 1952 (130–3). 12 refs. L.S.

A study of the distribution and morphology of these soils which have developed under moderate to heavy stands of mixed coniferous and deciduous forest.

29. Nygard, I. J., McMiller, P. R., and Hole, F. D. **Characteristics of some podzolic, brown forest and chernozem soils of the northern portion of the Lake States.** *Proc. Soil Sci. Soc. Amer.* 16 (2), 1952 (123–9). 16 refs. L.S.

A study of the morphology of the six great soil groups—chernozem, degraded chernozem, gray wooded, brown forest, brown podzolic and podzol, with a map showing their general distribution.

30. Storie, R. E., and Wieslander, A. E. **Dominant soils of the Redwood-Douglas Fir region of California.** *Proc. Soil Sci. Soc. Amer.* 16 (2), 1952 (163–7). L.S.

A survey of the soils of more than 3 million acres of the upland area of the *Sequoia sempervirens/Pseudotsuga taxifolia* region of California, with a classification for soil series and depth classes. The dominant soil series are divided into 6 groups according to their association with natural vegetation cover and their productivity for timber and grass. Groups 1 and 2 are associated with conifer timber forests; groups 3 and 4 with grass and Oak/grass types, and groups 5 and 6 with chaparral. Group 1 includes soils of podzolic character, represented by such series as the Hugo and Josephine. Group 2 are of alkaline character, and are represented by the Cornutt and Dubakella series. Group 3 are those classed as prairie soils, generally treeless and associated with perennial grasses and represented by the Los Osos and Kneeland series. Group 4 are those classed as noncalcic brown, associated with annual grasses and open stands of Oak, and represented by the Laughlin series. Group 5 are lithosols of low site-quality for grass and are represented by the Los Gatos series. Group 6 are lithosols of very low site-quality for grass and are represented by the Maymen and Henneke series. Data for 6 typical profiles are presented showing soil characteristics, vegetation, and ratings of suitability for timber or grass. Timber does best on medium-textured, deep (more than 4 ft. to bedrock), permeable, well drained soils where the annual rainfall exceeds 40 in. Grass grows best on finer textured, less permeable and less well drained, though shallower soils, which are typically less acid or more basic with depth. Chaparral can grow on very shallow soils. *From authors' summary.*

114.5. Soil Fertility. Soil Toxicity. Soil Depletion and Exhaustion

See also Nos. 30, 32, 181, 549–52.

31. Godman, R. M., and Gregory, R. A. **Physical soil characteristics related to site quality in climax stands of southeast Alaska.** *Tech. Note Alaska For. Res. Cent.* No. 17, 1953. pp. 1.

Figures compiled from preliminary data are given to show depths of organic layer and of mineral soil on site classes 1–5, with good, moderate, imperfect and poor drainage. A relationship between tree-root penetration in mineral soil and drainage was observed; root penetration in the mineral soil averaged 6½ in. with good drainage, and was limited almost entirely to the organic horizon where drainage was imperfect or poor. The better drained soils had a higher % of podzol profiles and the greatest degree of soil development.

114.6. Soil Biology

See also Nos. 21, 236.

32. Dobbs, C. G., and Hinson, W. H. **A widespread fungistasis in soils.** *Nature, Lond.* 172 (4370), 1953 (197–9). 17 refs. [University College of N. Wales, Bangor.]

Research in soil mycology at Bangor has been carried on since 1947. Starting with an attempt to discover where, and to what extent, the common mucorine moulds grow and sporulate in relatively undisturbed forest soils, it was soon extended to include other 'sugar fungi' (i.e. soil fungi unable to attack cellulose or lignin). Both field observations and laboratory tests have now shown that in normal soils the germination of the spores of such fungi is inhibited. A strain of *Penicillium frequentans* isolated from forest soil and having a high % of germination, was used as the main test species, and the test was applied to soils from 15 sites in N. Wales and one in Warwickshire and to subsoils from several sites. Complete inhibition was found in every sample of fresh soil tested (5 forest soils from under Spruce, Beech, Sycamore, Maple (2), and Oak; 5 grassland soils; 3 cultivated garden soils; 3 waterlogged soils); two subsoils also showed complete inhibition (a stiff clay from 3 ft. depth near a garden compost heap, and the finer fractions of a gritty subsoil at 2–2½ ft. depth on a formerly wooded site). Incomplete inhibition, allowing germination of a minute, fractional % of spores compared with controls, was found in 3 subsoils at 2–4 ft. depth. Germination not less than that shown with kaolin, has been found, so far, in drift material at 6 ft. depth

and in 4 samples of gritty subsoil from 3–4 ft. depth from a drain excavation under a wide path. The indications are that there exists in the soil a widespread fungistatic factor which, from its distribution in depth, possibly co-exists with some organic constituent of the soil. It seems to be masked, rather than destroyed, by the presence of glucose even as a trace, or of nutrients liberated from micro-organisms killed by heat or toxins, since it returns, presumably when the nutrient has been absorbed by the micro-organisms in the soil; but it may be removed by severe heating or prolonged desiccation, as it is then not rapidly restored. That spores must lie dormant in the soil is an inescapable deduction from the fact that they germinate in large numbers wherever soil is placed in contact with nutrient media; but that the nutrient is not necessarily responsible for their germination is clear from the fact that many spores germinate in distilled water.

33. DEBOUTTEVILLE, C. D. Microfaune du sol des pays tempérés et tropicaux. **[Soil microfauna of temperate and tropical countries.]** Hermann & Cie., 6 Rue de la Sorbonne, Paris. 1951. pp. 361. 44 pp. of refs. [F.] Price *Fr.*2000 [£2. 4*s*.]

The work is based largely on the results of the Paulian-Delamare expedition to the Ivory Coast (1945), and a 44-page appendix lists all the published works based on material from that expedition.

Part I, 'The soil', contains chapters on: techniques; the sites investigated [in France and the Ivory Coast]; characteristics of the soil profiles studied; the populations of some characteristic profiles; data on the populations of certain soil horizons in the Ivory Coast; soil microclimate; the soil as a habitat; microfauna in the life of the soil; the dynamic role of the soil microfauna in natural associations; quantitative distribution in depth; qualitative distribution; factors determining quantitative and qualitative variations of microfauna; annual population cycle; comparative morphology of soil fauna (mainly *Collembola*).

Part II, 'Dependencies of the soil', contains chapters on: 'suspended soils' and the 'soils of epiphytes'; rotten wood; development of the population in a dead termitary; fauna of cavities in trees; additional terrestrial habitats (e.g. soil held in the leaf sheaths of wild Palms).

Part III discusses the interdependence of soil populations, their origins and development.

34. MURPHY, P. W. **The biology of forest soils with special reference to the mesofauna or meiofauna.** *J. Soil Sci.* 4 (2), 1953 (155–93 + 2 plates). Numerous refs.

The meso- or meiofauna are defined by the author as those organisms collected by the funnel method of extraction, including Arachnida, Myriapoda and Insecta. He reviews and discusses literature on (1) quantitative surveys, (2) qualitative aspects, i.e. classification and life habits, (3) the role of the fauna in the life of the soil, (4) the 'activity' of soil organisms, and (5) soil fauna in relation to forestry practice. Present knowledge in this sphere is still insufficient to be of practical use to the forester, but more extensive data might provide a useful site index or be of value in assessing more specific soil properties, such as aeration. [Cf. *For. Abstr.* 13 (No. 905).]

35. HAARLØV, N. **Microarthropods from some Danish soils.** *Trans. 9th int. Congr. Ent., Amsterdam 1951* 1, 1952 (424–7). [E.] I.I.E.

Gives figures showing the relative size of populations on different sites, and the frequency of a number of species on a forest site.

116. *Hydrology. Soil and Water Conservation and Erosion*

See also Nos. 6–7, 11, 68, 245–8, 287.

36. **Reviews of research on arid zone hydrology.** *Arid Zone Programme, UNESCO, Paris* No. 1, 1953. pp. 212 + 8 maps in pocket. Many refs. Price £1. 5*s*.

A series of reports by experts, commissioned and published by Unesco, comprising the following: The problem of water resources in N.W. Africa (*G. Drouhin*); Research in hydrology and fluid mechanics and development of underground water in the arid regions of N.E. Africa (*Y. M. Simaika*); Hydrological research in arid and semi-arid areas in the Union of South Africa and Angola (*H. F. Frommurze*); Hydrological research in the Middle East (*N. Karatekin*); Hydrological research in the arid and semi-arid regions of India and Pakistan (*R. D. Dhir*); Report on the hydrological problems of the arid and semi-arid areas of the United States and Canada (*R. K. Linsley*); Hydrology and utilization of hydraulic resources, in the arid and semi-arid areas of Latin America (*G. A. F. de Lara*); The hydrology of arid and sub-arid Australia with special reference to underground water (*E. S. Hills*); and World distribution of arid and semi-arid homoclimates (*P. Meigs*). The last of these is illustrated by 2 maps (of the eastern and western hemispheres respectively) showing extremely arid, arid, and semi-arid regions, and type of winter (hot, mild, cool, and cold). [Cf. *For. Abstr.* 15 (No. 132).]

37. **[Study of fallen snow on the crowns of forest trees (first report).]** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 54, 1952 (115–64). [Jap.e.]

The following results were obtained from experiments between 1949 and 1951:

(1*a*) *Snow on a plane board*—(i) The height limit for snow deposited on a board of a given breadth is expressed as $h_M = Kb^{\alpha}$ where h_M is the maximum snow height in cm., b the breadth of the board in cm., and K and α are constants. (ii) The higher the air temperature, below zero, the greater was the cohesive power of the snow. (1*b*) *Snow on various built-up objects* (illustrated in diagrams and photographs)—(i) Boards of the same size arranged one above another: the rate of increase in the mass of snow on the sheltered boards, may be expressed as a % of the accumulation on the top board by

$$y_n \simeq 88N^{-1.4} + 56\,N^{-0.4}V_w, \text{ or}$$
$$y_n \simeq \tfrac{1}{4}d^{2/5(d+40V_w)}$$

where N = number of boards, V_w = wind velocity (below 1·5 m./sec.) in m./sec. and d = interval between the boards in cm. (ii) Snow on pyramidal objects with hexagonal base, on the same basal

area: here accumulation can be expressed as $y = c_1 - c_2 V_w$ where y is the ratio of the snow mass on the pyramid to that on a hexagonal area of the same area as the base, and c_1 and c_2 are constants. (iii) A combination of (i) and (ii) (hexagonal boards of decreasing size arranged above one another): the rate of increase in the mass of snow on the whole series is expresed as a % of the accumulation on exposed boards of the same shape and size by $y = 74\, d^{0.2} + d^{1.9} V_w$, until the spaces between the boards are filled, when the formula for (ii) applies. (1c) *Snow on an inclined plane*—The weight of snow per unit projection area bears no relation to the angle of slope, while the snow depth on a slope is greater than on a level plane and the snow density lower. The height on the slope is expressed by $h = h_o\ (a + b \sin\theta - c\, \theta^d V_w)$, where h_o is snow height on the horizontal plane, θ is the angle of inclination and a, b, c and d are constants.

(2) *The snow crown on a test tree*—Many characteristics of snow accumulation observed on a *Cryptomeria japonica* can be explained from the above results on models. *From author's summary.*

38. Whelan, D. E., Miller, L. E., and Cavallero, J. B. **A method of determining surface runoff by 'routing' infiltrated water through the soil profiles.** *Sta. Pap. Ntheast. For. Exp. Sta.* No. 54, 1952. pp. 15. 8 refs.

The method involves a study of the progress and disposal of infiltrating water through the soil by accounting for time stages in its movement and the changes in water storage in each soil horizon; each 'batch' of water from a period of uniform intensity of rainfall is followed separately. Run-off is computed by subtracting the amount of infiltrated water from the total rainfall. In developing the method a detailed study was made of the storm and flood of 17–18 July 1942 on the headwaters of the Allegheny river in W. New York and Pennsylvania. Data used were rainfall pattern, a land-use inventory (including depth of each horizon), soil/water relationships (surface detention storage, retention storage, percolation rates, and transmission velocity for each soil horizon) and subsurface run-off. Complete 'routing' data are presented for the surface humus and A–C horizons of a grazed woodland with mull humus and a medium-texture imperfectly drained soil, showing how the movement of the water and storage in the different horizons is computed from rainfall intensity, time of transmission, storage and percolation rates. This movement and disposal is also shown graphically, for the whole set of horizons, for each period of the 28-hours storm. Further graphs show the effect of contour planting and humus depth on the relationship of total rainfall to infiltrated water and surface run-off.

39. Friedrich, C. A. **Factors that determine spring runoff in the northern Rocky Mountains.** *Res. Note Nth. Rocky Mt. For. Range Exp. Sta.* No. 123, 1953. pp. 5.

Discusses conditions in 3 years—1948, when severe spring floods throughout the Columbia Basin followed the melting of heavy winter snows; 1950, when with even more snow than in 1948 there was no flooding; and 1953, when severe local floods occurred, especially in the Upper Missouri, but without significant snow melt.

40. Love, L. D. **Watershed management in the Colorado Rockies.** *J. Soil Wat. Conserv.* 8 (3), 1953 (107–12). 9 refs.

Comparison was made of streamflow data over a number of years in 2 comparable catchments, in one of which most of the Spruce was killed in 1947 by an attack of Englemann Spruce beetle. The consequent decrease in interception resulted in a lasting increase in streamflow from the affected catchment (as presented by an analysis of covariance) and is held to be an argument in favour of thinning dense virgin stands in order to increase water supply.

41. Kulig, L. Przebudowa składu gatunkowego lasów górskich jako czynnik regulowania spływu wód. **[Modifying the constitution of mountain forests as a means of controlling run-off.]** *Sylwan* 97 (1), 1953 (12–5). [Pol.]

Discusses the water-storage conditions offered by Spruce, Fir, and Beech forests in the mountains of southern Poland, and suggests controlling the thaw (and the summer floods) by converting Spruce stands into Fir/Beech.

42. Chapman, G. W. **Erosion and torrent control in the French Alps.** *Emp. For. Rev.* 32 (2), 1953 (144–7 + 8 photos).

Notes of a study tour.

43. Voce, B. Sistemazione idraulico-forestale dei bacini montani Oreto e Passo di Rigano in provincia di Palermo. **[Torrent training and afforestation in the mountain catchments of Oreto and Passo di Rigano in Palermo province.]** *Monti e Boschi* 4 (5), 1953 (211–21). [It.f.e.]

A popular account of the well known works for the control of floods etc. in the Conca d'Oro. About half of the mountainous catchments have been terraced and afforested in the past 20 years.

13. GENERAL ZOOLOGY

44. Howe, R. W., and Oxley, T. A. **Detection of insects by their carbon dioxide production.** H.M. Stationery Office, London. 1952. pp. 20. 13 refs. Price 1*s*. [Pest Infestation Laboratory, Slough.] P.R.

Describes the apparatus and procedure, and discusses the interpretation of results and the practical utility of the method.

45. Mittler, T. E. **Amino-acids in phloem sap and their excretion by aphids.** *Nature, Lond.* 172 (4370), 1953 (207). 5 refs.

Phloem sap of 2- to 4-year-old stems of *Salix* spp. was collected as it exuded through the several mouthparts of the aphid *Tuberolachnus salignus* and its chemical composition was compared with that of honey-dew excreted by aphids feeding on the same stems. All the amino-acids detected in the honey-dew were also present in the sap in a higher concentration. The greatest abundance and variety (11 or 12) of amino-acids in the phloem sap of Willow stems were found during the growth and senescence of their foliage; in the intervening period only small

amounts of two amino-acids could be detected. This agrees with previous observations that certain leaf-feeding aphids colonize growing and senescing leaves in preference to leaves in an intermediate, fully functioning condition.

14. SYSTEMATIC ZOOLOGY

145.7. Insecta. Entomology

See also Nos. 44–5, 441 *et seq.*, 851 *et seq.*

46. **First entomological conference.** *New Zealand Science Review, Wellington* 10 (7), 1952 (96–113). N.C.L.

The newly formed Entomological Society of New Zealand held its first conference in May 1952 at Nelson. A number of papers presented at the conference are printed in full or summarized in this issue of the *N.Z. Science Review*; those of forestry interest are abstracted separately in this issue of *Forestry Abstracts*.

47. RATCLIFFE, F. N., GAY, F. J., and GREAVES, T. **Australian termites: the biology, recognition, and economic importance of the common species.** Commonwealth Scientific and Industrial Research Organization, Australia. 1952. pp. 124. 22 refs. Price 15*s*.

48. SNYDER, T. E. **Termite biological notes.** *Pest Control* 21 (3), 1953 (40). P.R.

A brief account of recent European and American research on hormone-produced changes in the biology of some termite species.

49. MAHDIHASSAN, S. **On *Lakshadia fici* Green, with its red and yellow forms.** *Indian For.* 79 (7), 1953 (366–8). 16 refs.

A note on the literature, with a discussion of the question whether the red and yellow forms breed true to colour.

50. FREEMAN, T. N. **The Spruce budworm, *Choristoneura fumiferana* (Clem.) and an allied new species on Pine (Lepidoptera: Tortricidae).** *Repr.* from *Canad. Ent.* 85 (4), 1953 (121–7). (*Contr. Div. Ent. Dep. Agric. Can.* No. 3005).

The adult stage of *Choristoneura* [*Cacoecia*] *pinus* is described and differentiated from *C. fumiferana*. *C. pinus* feeds in the larval stage upon Pine, particularly *Pinus banksiana* and *P. resinosa*.

51. COX, C. E. **Analysis of frequency distribution of adults and larvae of *Choristoneura fumiferana* (Clem.) and *C. pinus* Free. (Lepidoptera: Tortricidae).** *Repr.* from *Canad. Ent.* 85 (4), 1953 (136–41). 3 refs. (*Contribution, Science Service, Department of Agriculture, Ottawa* No. 301.)

The width of the postclypeus and length of the median dorsal line from the anterior margin of the postclypeus to the termination of the adfrontal suture were measured on last-instar larvae of both species, and were used in the form of the postclypeal index, which proved sufficiently accurate for a rapid separation of the two species. The frequency distribution of the uncus width of 100 ♂ adults of each species was also examined by means of probability paper.

52. MACKAY, M. R. **The larvae of *Choristoneura fumiferana* (Clem.) and *C. pinus* Free. (Lepidoptera: Tortricidae).** *Repr.* from *Canad. Ent.* 85 (4), 1953 (128–33). 2 refs. (*Contr. Div. For. Biol. Dep. Agric. Can.* No. 60.)

53. CAMPBELL, I. M. **Morphological differences between the pupae and the egg clusters of *Choristoneura fumiferana* (Clem.) and *C. pinus* Free. (Lepidoptera: Tortricidae).** *Repr.* from *Canad. Ent.* 85 (4), 1953 (134–5). (*Contr. Div. For. Biol. Dep. Agric. Can.* No. 71.)

54. SMITH, S. G. **Reproductive isolation and the integrity of two sympatric species of *Choristoneura* (Lepidoptera: Tortricidae).** *Repr.* from *Canad. Ent.* 85 (4), 1953 (141–51). 10 refs. (*Contr. Div. For. Biol. Dep. Agric. Can.* No. 47.)

Introgressive hybridization between *Cacoecia pinus* and *C. fumiferana* is prevented in nature by reproductive isolation dependent on host-tree preferences, differences in times of emergence and rates of subsequent development plus a repugnance to cross-mating expressed by the ♀s of both species. Laboratory experiments, however, show that reciprocal hybridization is possible.

55. SMITH, S. G. **A breakdown among the components that provide reproductive isolation between the Spruce and Jack Pine budworms.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 9 (3), 1953 (2). 3 refs.

Observations made in the woods in May 1952 when the two species had resumed activity simultaneously, owing to unseasonably high temperatures, showed the efficacy of reproductive isolation (usually reinforced by temporal isolation) in preventing hybridization between them.

15. ANIMAL ECOLOGY. GAME AND FISH MANAGEMENT, HUNTING, SHOOTING AND FISHING

See also Nos. 427 *et seq.*, 1009–10.

56. ALLEE, W. C., and SCHMIDT, K. P. **Ecological animal geography.** John Wiley and Sons, Inc., New York; Chapman and Hall, Ltd., London. 2nd ed. (rev.) 1951. pp. xiii + 715. Many refs. Price $9·50.

Based on R. Hesse's *Tiergeographie auf oekologischer Grundlage* (1924). Contains a section on forest communities (508–32).

57. **Report of first ecological conference.** *New Zealand Science Review, Wellington* 10 (6), 1952 (78–93).

The newly formed New Zealand Ecological Society held its first conference at Wellington in May 1952, one session being devoted to methods of estimating populations. The following papers are summarized: Estimation of population (*R. M. Williams*); The botanist's viewpoint (*C. M. Smith*); Estimation of animal populations (*J. S. Watson*); Methods of estimating populations of marine organisms (*G. A. Knox*).

58. FERRÃO, W. P. C. DA FONSECA. Primeira tentativa de uma interpretação sinecológica da entomofauna florestal do Gerês. **[Preliminary**

attempt at a synecological interpretation of the forest insect fauna of the Serra do Gerês.] *Agron. lusit.* 12 (4), 1950 (499–515 + 2 tbls. + 8 photos). 4 refs. [Port.f.]

The results of a preliminary study of the insect population in relation to the vegetation. Figures are given for the numbers of insects of different families found in sample plots in (1) Pine forest, (2) Oak forest and (3) pasture-land.

59. SCHWERDTFEGER, F. Die natürliche Regelung der Populationsdichte bei den Forstinsekten. **[Natural control of forest insect populations.]** *Repr. from Trans. 9th int. Congr. Ent., Amsterdam 1951* 2, 1953 (203–8). [G.]

Reviews methods of studying factors affecting insect populations and discusses data collected in the Schorfheide Pine stands from 1935 to 1945 on fluctuations in populations of certain species.

60. VARLEY, G. C. **Ecological aspects of population regulation.** *Trans. 9th int. Congr. Ent., Amsterdam 1951* 2, 1953 (209–14). 10 refs. [E.e.g.f.] I.I.E.

Discusses the relationship of density-dependent factors to population size of forest insects and their parasites or predators.

61. KANGAS, E. **On population regulation of forest insects living in tree rind in Finland.** *Trans. 9th int. Congr. Ent., Amsterdam 1951* 2, 1953 (224–8). 5 refs. [E.] I.I.E.

Causes of mortality include: overpopulation, too rapid drying of the breeding substrate, or choice of too vigorous or too weak a tree for breeding. An analysis (shown in graphs and tables) of successful and unsuccessful attacks by *Blastophagus piniperda* on Pine and *Pissodes harcyniae* on Spruce during several years, shows that the proportion of successful attacks is not solely dependent on tree vigour class (based on size of crown and damage to it and on trunk length) but also on the relation between the condition of the tree and the attacking power of the insect.

62. HOY, J. M. **Associations between insects and nematodes.** *New Zealand Science Review, Wellington* 10 (7), 1952 (100–2). 8 refs. N.C.L.

A general survey with particular emphasis on examples of primary parasitism of nematodes on insects from New Zealand.

63. STEWART, R. E., and ALDRICH, J. W. **Removal and repopulation of breeding birds in a Spruce-Fir forest community.** *Auk, Lancaster, Pa.* 68 (4), 1951 (471–82). 9 refs. L.S.

The information was obtained in connexion with investigations on the control of *Cacoecia fumiferana* by breeding birds. The report is confined to a study of populations before and after removal by shooting. [Cf. *For. Abstr.* 14 (No. 3534).]

64. HENSLEY, M. M., and COPE, J. B. **Further data on removal and repopulation of the breeding birds in a Spruce-Fir forest community.** *Auk, Lancaster, Pa.* 68 (4), 1951 (483–93). 8 refs. L.S.

A continuation of previous investigations. [Cf. preceding abstract.]

65. EVANS, E. F. **Game squirrels of Texas—the grey squirrel.** *Texas Game and Fish, Austin* 11 (3), 1953 (13–4, 27). B.A.P.

Includes notes on food habits. *Quercus phellos* is the key food of grey squirrels in eastern Texas, acorn production being directly related to squirrel populations. *Q. rhombica* is also an important food tree. Hickory [*Carya* sp.] nuts are a favourite food, and may be taken in the autumn before they are ripe enough to drop.

66. LAMPIO, T. **Squirrel hunting based on the ecology of the species.** *Papers on Game Research, Helsinki* No. 8, 1952 (44–9). 8 refs. [E.] B.A.P.

Food supply influences both the fecundity and the migration of squirrels. In Finland, since most squirrels live outside the range of Oak and Hazel, Spruce seeds form their main diet. In poor Spruce seed years, Pine seed is taken, and in the absence of Pine seed, Spruce buds. Estimation of food supply can therefore give an indication of the state of the populations and hunting can be regulated accordingly. [Cf. *For. Abstr.* 14 (No. 2420).]

67. CREUTZ, G. Zur Ernährungsweise des Eichhörnchens, *Sciurus vulgaris fuscoater* Altum, 1876. **[The food habits of *S. vulgaris fuscoater*.]** *Säugetierkundliche Mitteilungen, Stuttgart* 1 (1), 1953 (31). [G.] B.A.P.

A note on squirrels observed eating fruit of *Taxus baccata* at Pillnitz, near Dresden.

68. EDMINSTER, F. C., and MAY, R. M. **Shrub plantings for soil conservation and wildlife cover in the Northeast [of the U.S.A.].** *Circ. U.S. Dep. Agric.* No. 887, 1951. pp. 68.

Notes on a number of suitable species.

16. GENERAL BOTANY

160. *Plant Chemistry*

See also Nos. 19–21, 45, 71, 78–9, 82–4, 124, 140, 224, 677 *et seq.*, 949 *et seq.*

69. BATE-SMITH, E. C. **Colour reactions of flowers attributed to (*a*) flavanols and (*b*) carotenoid oxides.** *J. exp. Bot.* 4 (10), 1953 (1–9). O.B.D.

Extracts of petals of white flowers of a large number of woody plants gave a red colour with vanillin in concentrated HCl, the reaction being possibly due to the presence of flavanols. With the exception of 2 species of Malvaceae, no flowers of herbaceous plants gave this reaction.

70. MIGITA, N., KANDA, T., and FUJINAMI, R. **Chemical studies of cork substance (II). Chemical composition of suberin in the cork of *Quercus variabilis*.** *J. Jap. For. Soc.* 33, 1951 (424–6). From *abstr.* in *Rec. Res. Fac. Agric. Univ. Tokyo* No. 2, 1951/52 (1953), (82–3). [E.]

Cf. *For. Abstr.* 14 (No. 975).

161. *Physiology*

See also Nos. 139, 145–7, 155–6, 200, 222, 224, 307–8, 626–7, 629–31, 651, 681, 837–42.

71. **Annual review of plant physiology.** Annual Reviews, Inc., Stanford, Calif. No. 4, 1953. pp. 453. Many refs. Price $6·00.

Includes the following review articles, containing references to many forest species: Nitrogen metabolism of higher plants (*J. G. Wood*); Photosynthesis (*A. H. Brown* and *A. W. Frenkel*); The use of respiratory inhibitors (*W. O. James*); Organic acids in plant metabolism (*R. H. Burris*); Hematin compounds in plants (*R. Hill* and *E. F. Hartree*); The relation of chemical structure to biological activity in growth substances (*H. Veldstra*); The physiology of fruit growth (*J. P. Nitsch*); Physiology of root growth (*H. Burström*); Herbicides (*A. S. Crafts*); Fluorescent substances in plants (*R. H. Goodwin*); The biogenesis of terpenes (*A. J. Haagen-Smit*); Physiology of mycorrhizal relations in plants (*E. Melin*); The effect of temperature on plant growth (*F. W. Went*); Physical properties of protoplasm (*H. I. Virgin*); and The plant sterols (*W. Bergmann*).

72. SHIBAMOTO, T., and KAWANA, A. **[The influence of aeration on the water culture of *Cinnamomum camphora*. (III) The effect of adding H_2O_2 to the medium on growth of seedlings of *Zelkova serrata* grown in solution.]** *Bull. Tokyo Univ. For.* No. 44, 1953 (23–9). 17 refs. [Jap.e.]

[Cf. *For. Abstr.* 14 (Nos. 1924–5).] The amount of O absorbed and the dissolved O required by the seedlings vary with season and temperature. The addition of moderate amounts of H_2O_2 to the nutrient substrate increased root and leaf growth, while plants given excessive amounts showed O toxicity. Aeration by adding H_2O_2 to the nutrient is considered effective and convenient. *From authors' summary.*

73. LINDSAY, H. A. **Notes on water-yielding plants in Australia.** *South Australian Naturalist, Adelaide* 26 (1), 1951 (9–13). L.S.

Methods of obtaining water from roots and sapwood, and species suitable for this purpose found in the semi-arid and arid regions of Australia.

74. FIELDING, J. M. **The moisture content of the trunks of Monterey Pine trees.** *Aust. For.* 16 (1), 1952 (3–21). 13 refs.

Investigations were carried out between 1939 and 1942 in S. Australia to determine the amount and distribution of moisture within the trunks of Monterey Pine (*P. radiata*) trees and to study the differences from tree to tree. Between 1946 and 1948, additional but less extensive investigations were conducted in the Australian Capital Territory. Large variations occur within each tree. The vertical distribution of water shows several distinct trends: in some trees the moisture content decreases from the base to a minimum and then increases again towards the top, in others it increases progressively up the tree, while in yet others it decreases progressively with height. The heartwood is a dry region with a m.c. of ca. 45%. The m.c. of the sapwood varies throughout the tree both vertically and laterally. Big differences in m.c. occur from tree to tree. The wood of young trees is much moister than that of old trees and the m.c. of trees of fast-growing stands is higher than that of trees of the same age growing on poorer sites. In some stands the wood of dominant trees is moister than that of the suppressed. Interesting seasonal changes occur in the m.c. of the trees, those studied at Mt. Burr containing more water in spring than in autumn. *From author's summary.*

75. JENSEN, R. A., and DAVIS, J. R. **Seasonal moisture variations in Aspen.** *Minn. For. Note* No. 19, 1953. pp. 2.

Investigations into the moisture content of living trees of *Populus tremuloides* in Minnesota showed that m.c. was at its lowest from June to September inclusive, and high from November to April inclusive, May and October being transitional periods. There were also considerable variations between different parts of Minnesota.

76. SATOO, T. **Influence of wind on transpiration of seedlings of *Cryptomeria japonica* grown under different soil moisture conditions.** *Bull. Tokyo Univ. For.* No. 44, 1953 (1–6). 11 refs. [E.e.jap.]

One-year seedlings of *C. japonica* were grown in pots in 3 moisture conditions, wet, moist and dry. For the experiment, 9 seedlings considered representative were selected from each group and their roots were removed before testing. Moisture content of both old and newly developed needles was highest in seedlings grown in wet and lowest in those grown in dry conditions. Transpiration of seedlings in calm air was roughly the same for all 3 groups, but increased when they were exposed to wind, the increase being highest in those grown in wet and lowest in those grown in dry conditions. [Cf. *For. Abstr.* 13 (No. 2765).]

77. SCHENK, W. Untersuchungen über die Beziehungen zwischen Lichtfeld und Chlorophyllgehalt an Sprossrinden und Blättern von Holzgewächsen. **[The relationship between light distribution and chlorophyll content of the bark and leaves of shoots of woody plants.]** *Planta* 41 (3), 1952 (290–310). Numerous refs. [G.g.] O.B.D.

Chlorophyll content of shoots of *Fagus sylvatica* and other hardwoods showed definite gradations in accordance with the resistance to radiation or the light-absorption capacity of the plants themselves. In a stand of *F. sylvatica*, with increasing distance from the sunny margin, and with decrease in light intensity, the chlorophyll content of leaf and bark increased. The upper side of shoots exposed to sun contained less chlorophyll than the underside, but this position was gradually reversed with decreasing light intensity. Inconsistencies in past researches into the chlorophyll content of sun and shade leaves of Beech are partly due to the fact that this phenomenon was not taken into account when specimens were selected. There exist also inherent differences in the reaction of the trees themselves, some being more 'photo-stable' than others. Chlorophyll content of the bark increases with age and fluctuates according to the season. The fluctuation however does not appear to be due to climatic factors, but to an endogenous rhythm in the formation of plastids.

78. LÖHR, E. Die Zuckerarten im Blutungssaft von *Betula* und *Carpinus*. **[The sugars in spring sap of *Betula* and *Carpinus*.]** *Physiol. Plant., Copenhagen* 6 (3), 1953 (529–32). 14 refs. [G.g.]

The spring sap of *Betula verrucosa*, *B. pubescens*, and *Carpinus betulus* in Denmark contains glucose and fructose. The glucose/fructose ratio in Birch increases from 0·5 in mid-March to 1·6 on 11 April. Corresponding figures for Hornbeam are 1·7 and 3·2.

79. Mothes, K., and Engelbrecht, L. Über Allantoinsäure und Allantoin. I. Ihre Rolle als Wanderform des Stickstoffs und ihre Beziehungen zum Eiweissstoffwechsel des Ahorns. [**Allantoic acid and allantoin. I. Their role as a mobile form of N, and their connexion with the protein metabolism of *Acer* spp.**] *Flora, Jena* 139 (4), 1952 (586–616). 54 refs. [G.g.] O.B.D.

80. Sato, Y., and Muto, K. [**Fundamental studies on the nutritional physiology of *Picea* spp. (I).**] *Res. Bull. exp. For. Hokkaido Univ.* 16 (2), 1953 (206–27 + 1 photo). 2 refs. [Jap.e.]

Seeds of *P. jezoensis*, *P. glehnii* and *P. abies* were sown in vessels with quartz sand on 3 May 1952, nutrient solutions were supplied from 25 May and the seedlings were transplanted to water culture in pots containing nutrient solutions on 11 June. Controls were given the complete nutrient solution throughout and other seedlings were given at different periods incomplete solutions lacking either N, P or K. The following results were obtained: (1) *P. jezoensis:* (*a*) growth was normal, as compared with the controls, when N or P was withheld after 95 days or K after 80 days, on the complete solution; (*b*) lack of N or K for 20 days or of P for 35 days at the beginning of the culture, did not affect growth; (*c*) seedlings supplied with N or P for 20 days after 14 July or with K for 20 days after 14 June or 13 August, made more growth than when the nutrients were supplied for a period of 20 days at other times during the experiment.

(2) *P. glehnii:* (*a*) seedlings made normal growth when N, P or K was withheld after 95 days, on the complete solution; (*b*) lack of N or P for 20 days or of K for 35 days at the beginning of culture, did not affect growth; (*c*) seedlings responded best to the presence of N or P for 20-day periods from 14 June to 18 August and to K from 14 June to 2 September.

(3) *P. abies:* (*a*) growth was normal when N was withheld after 95 days and P or K after 80 days; (*b*) lack of N for the first 35 and of P or K for 35 days or more, did not affect growth; (*c*) the most effective use of all 3 elements was made during the 20 days after 19 July. [Results are given in tables with English legends.] *From authors' summary.*

81. Duff, G. H., and Nolan, N. J. **Growth and morphogenesis in the Canadian forest species. 1. The controls of cambial and apical activity in *Pinus resinosa* Ait.** *Canad. J. Bot.* 31 (4), 1953 (471–513). 6 refs. O.R.S.

Measurements made on several slow or rapid growing trees, in the open or in the forest, of (1) the widths of internodal wood rings of a single year followed in sequence from internode to internode down the tree from the apex, and (2) the ring widths in the ring sequence, conventional for growth studies, passing from ring to ring in a given internode, showed distinct patterns common to the different sequences within a tree and to different trees. These are believed to be controlled by nutritional gradients in the axis, related to distribution of foliage and light along the tree axis. In both types of sequence the pattern masks variations caused by random external factors and limits the value of these sequences for examining the effect of such factors. This can be overcome by unpatterned sequences obtained by measuring the width of internodal rings in different internodes and of different years of growth but with a uniform number of other rings separating them from the pith. The factors affecting terminal and cambial growth as shown by this type of sequence are discussed.

82. Fransson, P. **Studies on auxin in young stem parts of *Pinus silvestris*.** *Physiol. Plant., Copenhagen* 6 (3), 1953 (544–50). 10 refs.

The following differences were found between auxin from young (15-year-old) Pine stems and β-indolylacetic acid. (1) The activity of Pine auxin is influenced by the acidity of the test agar; it is low at pH 2·7 and increases with increasing pH values to a maximum at ca. pH 5·6, whereas β-indolylacetic acid shows no difference in activity at pH 2·7 and pH 5·6. (2) The relation between activity and concentration of auxin is different. (3) Diffusion coefficients are 0·749 for Pine auxin and 0·583 for β-indolylacetic acid. *From author's summary.*

83. Hatano, K. **The amino acids in the seeds and seedlings of *Ginkgo biloba*.** *Bull. Tokyo Univ. For.* No. 44, 1953 (221–7 + 8 dgms.). 13 refs. [E.e.jap.]

84. Hattori, S., and Siroya, T. [**The sugars in the seeds and seedlings of *Pinus thunbergii*.**] *Bot. Mag., Tokyo* 64, 1951 (137–45). 17 refs. [Jap.jap.] I.M.I.

Raffinose and stachyose, found in dormant seed, disappear at germination while the % of sucrose increases. Immediately after germination, the action of α-galactase is weak, and of invertase strong.

85. Hatano, K. **On the absorption of water by seeds of *Larix kaempferi* [*L. leptolepis*] and *Pinus thunbergii*.** *J. Jap. For. Soc.* 33, 1951 (426–30). From *abstr.* in *Rec. Res. Fac. Agric. Univ. Tokyo* No. 2, 1951/52 (1953), (57). [E.]

The seeds of *L. leptolepis* and *P. thunbergii* absorb water over the whole surface of the seed-coat. Before seeds germinated, water representing 116% of the original weight was absorbed on average by 7 seeds of *L. leptolepis* at 20° C., and 75% by 9 seeds of *P. thunbergii* at 25°. The speed of absorption varied in three steps: (1) very high, (2) almost no absorption and (3) again very high. [Cf. *For. Abstr.* 14 (No. 2026).]

86. Watanabe, A. [**Absorption of water by seeds of Hazenoki (*Rhus succedanea*).**] *Bull. Tokyo Univ. For.* No. 44, 1953 (7–13). 7 refs. [Jap.e.]

Four stages of water absorption were observed, the first (a very slow increase in weight) probably characteristic of hard seeds, and the other 3 corresponding to those observed for conifer seeds [see *For. Abstr.* 13 (No. 1049)]. The 3rd stage, corresponding to stage (2) in conifers, was very short and often negligible. Treatment with H_2SO_4 increased the permeability of the endocarp and considerably reduced the first stage. Seeds treated with H_2SO_4 absorbed more water than untreated

ones, but the amount of water absorbed by the internal organs showed no significant differences between the two. [Results are given in graphs with English legends.] *From author's summary.*

87. SIMINOVITCH, D., and BRIGGS, D. R. **Studies in the chemistry of the living bark of the Black Locust in relation to its frost hardiness. III. The validity of plasmolysis and desiccation tests for determining the frost hardiness of bark tissue. IV. Effects of ringing on translocation, protein synthesis and the development of hardiness.** *Plant Physiol.* 28 (1; 2), 1953 (15–34; 177–200). 11 + 26 refs. O.R.E.

(III) The validity of the use of the plasmolysis test (i.e. the determination of the % survival of cells after dehydration by plasmolysis, as effected by subjecting the tissues to a graded series of strong salt solutions) and the desiccation test (survival of cells after desiccation in atmospheres of varied relative humidities produced over a graded series of H_2SO_4 solutions) was examined and established by comparing such tests with actual freezing tests carried out under natural and standardized laboratory conditions. Special emphasis is laid on the use of the dehydration test for the testing of frost hardiness of plants in the laboratory. [Cf. *For. Abstr.* 12 (No. 947).]

(IV) In order to investigate the relationship between the water-soluble protein content of the cells of living bark and the ability of these cells to withstand injury by extracellular freezing or dehydration, segments of the bark of *Robinia pseudoacacia* were isolated *in situ* from phloem continuity with the rest of the tree by ringing. Care was taken not to injure the xylem when ringing. The rings were cut at different times along the trunk from July to September. A series of segments was thus given on each tree, all being isolated from the root at the time when the first rings were cut, and each being isolated from the crown only after a later ring was cut above that particular segment. Living bark tissue from the different segments was tested for winter hardiness and analysed for insoluble protein N, water-soluble protein N, non-protein N, soluble carbohydrate and starch content both at the time of isolation and again in November. A positive correlation was found between the water-soluble protein content (in excess of a summer minimum) and the degree of hardiness of the tissues under all conditions studied. No such relationship was found for the other components for which analyses were made. The synthesis in autumn of the water-soluble proteins depends upon the preliminary accumulation in the bark tissue of some factor (or factors) which must reach the cells through phloem transport before their isolation, by ringing, from the leaves (or root) of the tree. This factor seems to be mobilized from the leaves only in late summer and autumn, reaching its maximum in September, just before leaf abscission. *From authors' summary.*

163. *Embryology*

See also No. 99.

88. THOMAS, R. B. **Reproduction in *Pinus virginiana* Miller.** *Abstr. of thesis*, in *Dissert. Abstr.* 13 (1), 1953 (9–10). [Vanderbilt University.] O.R.S.

Describes the processes of microsporogenesis, megasporogenesis, development of the ♂ and ♀ gametophytes, fertilization and development of the proembryo.

164. *Morphology*

See also Nos. 99–100, 111, 144, 233.

89. THOMPSON, J. M. **A further contribution to our knowledge of cauliflorous plants with special reference to the Cannonball tree (*Couroupita guianensis* Aubl.).** *Proc. Linn. Soc., Lond.* 163 (3), 1952 (233–50 + 14 plates). O.B.D.

90. RAO, C. V. **Floral anatomy of some Malvales and its bearing on the affinities of families included in the order.** *J. Indian bot. Soc.* 31 (3), 1952 (171–203). 22 refs. O.B.D.

91. HAMILTON, C. D. **The operculum of Marri (*Eucalyptus calophylla* R. Br.).** *Aust. For.* 16 (1), 1952 (43–5). 2 refs.

165. *Phylogeny, Evolution. Heredity, Genetics and Breeding, Variation*

See also Nos. 115, 121, 127–8, 208–11, 480, 616.

92. WRIGHT, J. W. **A directory of forest genetics research in the United States and Canada.** *Sta. Pap. Ntheast. For. Exp. Sta.* No. 53, 1952. pp. 10.

Lists individuals and organizations concerned with research, with a brief indication of the subjects covered.

93. WRIGHT, J. W. **Summary of tree-breeding experiments by the Northeastern Forest Experiment Station, 1947–1950.** *Sta. Pap. Ntheast. For. Exp. Sta.* No. 56, 1953. pp. 47. 42 refs.

Techniques are described, and results are discussed and tabulated for the genera *Acer*, *Fraxinus*, *Liriodendron*, *Quercus*, *Abies*, *Picea* and *Pinus*.

94. RAMBO, L. **Test tube Pine trees.** *Naval Stores Rev.* 63 (19), 1953 (12–4, 27–8).

Summarizes the organization and work in Pine breeding at the Lake City Research Centre of the U.S. Forest Service.

95. ZOBEL, B. J. **Are there natural Loblolly-Shortleaf Pine hybrids?** *J. For.* 51 (7), 1953 (494–5). 7 refs.

Reviews the evidence without coming to a definite conclusion.

96. ZENKE, U. Untersuchungen über den Ablauf der Meiosis bei *Pseudotsuga taxifolia* Britton. **[The course of meiosis in *P. taxifolia*.]** *Z. Forstgenet.* 2 (5), 1953 (96–102). 8 refs. [G.g.e.]

Presents the results of studies on *P. taxifolia* var. *viridis*.

97. TESDORFF, H. Vorläufige Mitteilung über Kreuzungsversuche mit *Araucaria*. **[Preliminary report on trials in crossing *Araucaria*.]** *Z. Forstgenet.* 2 (4), 1953 (90). [G.]

Cross-pollination of *A. araucana* and *A. angustifolia* has been successfully accomplished, and it is hoped to obtain seeds in 1953 and 1954.

98. L'attivita 1952–1953 dell'Istituto di sperimentazione per la pioppicoltura di Casale Monferrato. **[Activity of the Poplar research institute at Casale Monferrato during 1952–3.]** *Cellulosa e Carta, Roma* 4 (5), 1953 (10–1). [It.]

Deals mainly with artificial hybridization, particularly the use of pollen from a polyploid form of '*P. euramericana* clone 438' for crossing with two clones of *P. angulata*, one of *P. nigra* and '*P. euramericana* I 214'. The pollen of this polyploid has larger grains and more variation in size of grains than the diploid ♀ parent, and germinability increased by one-third.

99. SEITZ, F. W. Über anomale Zwitterblüten eines Klones der Gattung *Populus*, Sektion *Leuce*. **[Anomalous androgynous flowers of a clone of the section *Leuce* of the genus *Populus*.]** *Z. Forstgenet.* 2 (4), 1953 (77–90). 24 refs. [G.g.e.] [Bundesanstalt für Forst- und Holzwirtschaft, Abt. Forstgenetik und Forstpflanzenzüchtung, Schmalenbeck.]

Embryological and cytological studies of material from Dillingen. [Cf. *For. Abstr.* 14 (No. 3176).]

100. SCHLENKER, G. Beobachtungen über die Geschlechtsverhältnisse bei jungen Graupappeln und Aspen. **[Sex distribution in young Grey Poplar and Aspen.]** *Z. Forstgenet.* 2 (5), 1953 (102–4). 3 refs. [G.e.]

The 5- and 6-year-old progeny of *Populus tremula* and *P. alba* crosses were studied for sex distribution. Crosses between *P. tremula* ♀ × *P. alba* ♂ gave hybrids that were predominantly ♀. Progeny from *P. alba* ♀ and *P. tremula* ♂ crosses were ¾ pure ♂ or predominantly ♂, and ¼ ♀, or predominantly ♀. These data are considered to support the hypothesis of primitive bisexuality in the section *Leuce*.

101. JOHNSSON, H. **Development of triploid and diploid *Populus tremula* during the juvenile period.** *Z. Forstgenet.* 2 (4), 1953 (73–7). 7 refs. [E.e.g.] [Forest Tree Breeding Institute, Ekebo, Källstorp.]

Presents statistics illustrating the development of 9-year-old triploid and diploid populations of *Populus tremula* grown at Mykinge experimental farm in the Jönköping district. The triploid families show greater average growth in height and volume than the diploids, but also greater variations in height and volume, probably owing to the occurrence of aneuploids in the triploid families.

166. *Economic Botany*

See also section 892.

102. WHYTE, R. O., NILSSON-LEISSNER, G., and TRUMBLE, H. C. **Legumes in agriculture.** *FAO agric. Stud.* No. 21, 1953. pp. 367 + 58 photos. 126 refs. Price U.S. $3·00 or 15*s*.

Part I (pp. 1–246) contains chapters on: economic botany of legumes; ecological and biotic relationships; relation to soil fertility; alternate husbandry; association with grasses; use as animal feed; tropics and sub-tropics; poisonous plants and weeds; the significance of symbiotic N fixation; plant introduction and exploration; adaptation, strain variation and breeding; investigation and testing of improved strains; production of seed. Part II (pp. 249–346) consists of notes on individual genera and species, including many trees and shrubs.

103. WILLIAMS, R. O., and WILLIAMS, R. O., JR. **The useful and ornamental plants of Trinidad and Tobago.** Guardian Commercial Printery, Port-of-Spain, Trinidad. 4th ed. (rev.) 1951. pp. 335. Price 12*s*.

Contains sections on forest crops, trees, and shrubs.

168. *Histology*

See Nos. 605 *et seq.*, 681–4, 952.

17. SYSTEMATIC BOTANY

172.8. Eumycetes (True Fungi)

See also Nos. 401 *et seq.*, 452, 836 *et seq.*

104. BARNETT, H. L., and STALEY, J. M. **Isolation of compatibility types of *Endoconidiophora fagacearum* from Oak wilt trees naturally and artificially inoculated.** *Phytopathology* 43 (6), 1953 (341–3). 8 refs.

Both A and B isolates were recovered from only 2 of 43 naturally infected trees. Only 1 compatibility type (with 1 exception) was recovered from trees artificially inoculated with both types. A process of selection therefore appeared to operate in each tree, but the mechanism of this process is unknown.

174. *Spermatophyta, Seed-Plants in General. Floras and Check-Lists*

See also Nos. 103, 595, 607 *et seq.*, 682.

105. LI, H.-L. **Families and genera of Formosan plants. 1. Monocotyledons.** *Quart. J. Taiwan Mus.* 2 (2/3), 1949 (45–156). [E.chin.]

106. LIU, T.-S. **The vegetation and flora of the Pescadore Islands.** *Quart. J. Taiwan Mus.* 2 (4), 1949 (173–211). [E.jap.]

The associations discussed include the *Pandanus tectorius* association in the SW part of the main island, the forests of *Casuarina equisetifolia* planted as windbreaks along the coasts, and mixed forest of *Leucaena glauca*, *Albizzia lebbek* and *Acacia farnesiana* planted on a watershed.

107. ROSAYRO, R. A. DE. **The field characters of trees of the tropical wet evergreen forests of Ceylon.** *Ceylon Forester* (*n.s.*) 1 (1; 2; 3), 1953 (25–34; 67–71; 205). 13 refs.

These forests contain a large number of species (125 of the more common ones have been described), the majority of which are difficult to identify. Flowering and fruiting material is not always available and is usually difficult to obtain owing to the great heights of the trees. Field characters such as those of bark, bole and blaze afford a rapid means of identification in the field, and in this paper an attempt is made to set out the field characters of the more important species for sizes over 12 in. g.b.h.

108. PARDY, A. A. **Notes on indigenous trees and shrubs of Southern Rhodesia.** *Rhod. agric. J.* 50 (2; 3), 1953 (152–3; 186–7 + 8 plates). E.M.B.

Colophospermum [*Copaifera*] *mopane*, *Khaya nyasica*, *Vitex payos* (*hildebrandtii*), and *Grewia obliqua*.

109. **Vernacular-botanical names of some trees and shrubs in Mashonaland.** *Rhod. agric. J.* 50 (2), 1953 (154–76). E.M.B.

Over 1200, listed alphabetically by vernacular name.

110. HILDEBRAND, F. H. Boomnamenlijst van Riouw en Indragiri (Sumatra). **[List of tree species from Rhio and Indragiri (Sumatra).]** *Rapp. Bosbouwproefsta., Bogor* No. 61, 1953. pp. 69. [Jav.Du.E.]

The list is in two parts arranged (1) by vernacular names and (2) under family, genus and species. Each part gives the local name, its language or dialect, scientific name, and durability class of the wood. [Cf. *For. Abstr.* 14 (Nos. 3082–3).]

174.2. Gymnosperms

See also Nos. 95, 970.

111. VIDAKOVIĆ, M. Prilog poznavanju oblika vrste *Pinus halepensis* Mill. **[Forms of *P. halepensis*.]** *Šum. List* 77 (1), 1953 (11–8). 11 refs. [Croat.croat.g.]

Presents the results of morphological observations on cones and leaves of *P. halepensis* from various sites in Dalmatia, and from Montpellier (France). There exist two extreme cone forms, one of which has flat, and the other markedly convex, scales. Marked differences are also noted in the anatomy of needles.

112. FUKAREK, P. Novi varietet munike sa područja Srbije i Sandžaka (Crna Gora). **[A new variety of *Pinus heldreichii* from the region of Serbia and the Sanjak (Montenegro).]** *Godišnj. biol. Inst., Sarajevo* 4 (1), 1951 (41–50). 14 refs. [Croat.g.]

P. heldreichii var. *pancici* var. nov., with Latin diagnosis and a comparison of its characters with *P. heldreichii*.

113. FIELDING, J. M. **The Chiapas White Pine.** *Aust. For.* 15 (2), 1951 (114).

A note on a variety of *Pinus strobus* found in Mexico and Guatemala, which makes very rapid growth and apparently produces wood of good quality.

114. FRANCO, J. DO AMARAL. **On the nomenclature of the Douglas Fir.** Sociedade Astoria, Limitada, Regueirão dos Anjos, 68, Lisbon. 1953. pp. 6. 1 ref. [E.] Instituto Superior de Agronomia, Lisbon.]

Presents further arguments to support the validity of the name *Pseudotsuga menziesii* for *P. taxifolia*. [Cf. *For. Abstr.* 14 (No. 1977).]

176.1 Dicotyledons

See also No. 138.

115. DUMITRIU-TĂTĂRANU, I. Insemnări dendrologice. 1. O staţiune cu biota (*Thuja orientalis*) subspontană. 2. *Carpinus betulus* L. var. *arnotae* n. var. **[Dendrological notes. 1. A semi-natural stand of *T. orientalis*. 2. *C. betulus* var. *arnotae* var. nov.]** *Rev. Pădurilor* 66 (12), 1951 (11–3). 2 refs. [Rum.rum.russ.]

(1) Describes an example of natural regeneration of *T. orientalis* in Rumania; (2) describes a Hornbeam, possibly a *C. betulus* × *C. orientalis* hybrid, to which the name *C. betulus* var. *arnotae* is tentatively given. The formal description is in Latin.

116. HARDIN, J. W. **The Juglandaceae and Corylaceae of Tennessee.** *Castanea* 17 (2), 1952 (78–89). 7 refs.

Notes on the species and their distribution.

117. PERRIER DE LA BATHIE, H. Les *Adansonia* de Madagascar et leur utilisation. 2e note. **[*Adansonia* spp. of Madagascar and their uses. 2nd report.]** *Rev. int. Bot. appl. Agric. trop.* 33 (367/368), 1953 (241–4). 1 ref. [F.] P.R.

Gives a key to, and describes, *A. alba*, *A. digitata*, *A. fony*, *A. grandidieri*, *A. madagascariensis*, *A. suarezensis*, and *A. za*. [Cf. *For. Abstr.* 15 (No. 954).]

118. KOSTERMANS, A. J. G. H. Beberapa keterangan tentang djenis² Durian dalan hutan² dekat Samarinda, Kalimantan-Timur. **[Some notes on *Durio* spp. found in the forests near Samarinda, E. Borneo.]** *Rimba Indonesia* 2 (4), 1953 (164–9). [Jav.e.]

Describes briefly and distinguishes between the following 8 species: Durian (*D. zibethinus*) and Lai (*D. kutejensis*), both cultivated species in E. Borneo, Lahong or Lajang (*D. dulcis*), Durian Anggang or Taula Tongau, Kerantongan (*E. oxleyanus*), Lai Kaju (*D. acutifolius*), *D. griffithii*, and Taula, a scarce species, of which the author has only a little herbarium material. There is considerable confusion among the species and identification is difficult. Most of the species have edible fruits.

119. PERRY, L. M. **Plantae Papuanae Archboldianae, XXI. The Papuasian species of *Macaranga*.** *J. Arnold Arbor.* 34 (3), 1953 (191–257).

Descriptions of the species, with key.

120. MARTÍNEZ, M. Los encinos de México y Centroamérica. II. **[The Oaks of Mexico and Central America. II.]** *An. Inst. Biol. Univ. Méx.* 23, 1952 (53–83). [Span.] C.G.B.

Describes 8 *Quercus* spp. and gives localities in which they are found throughout Mexico and Central America. [Cf. *For. Abstr.* 14 (No. 1023).]

121. MOLDENKE, H. N. **Notes on new and noteworthy plants. XVI.** *Phytologia* 3 (4), 1953 (285–95). A.P.B.

Includes notes on × *Quercus caesariensis* hybr. nov. (natural hybrid of *Q. rubra* and *Q. ilicifolia*), × *Q. pinetorum* hybr. nov. (natural hybrid of *Q. rubra* and *Q. velutina*), and two new species of *Vitex*.

122. RAIZADA, M. B. **The correct identity and status of *Flacourtia ramontchii* l'Herit. and *F. sepiaria* Roxb.** *Indian For.* 79 (9), 1953 (503–5).

Discusses the synonymy of the two species and maintains their separate specific status against Merrill's attempt to include both in *F. indica*.

123. RAIZADA, M. B., and CHATTERJI, R. N. **The correct name of Indian Babul.** *Indian For.* 79 (8), 1953 (420–1).

Concludes that *Acacia arabica* is the valid name.

124. FUJITA, Y. **[*Cinnamomum camphora* Sieb. and its allied species [*C. camphora* var.**

***linaloolifera, C. nominale, C. nominale* var. *linalis, C. micranthum,* and *C. kanahirai*]: their interrelation as regards species characteristics chemical constituents, geographical distribution and evolution.]** *Bot. Mag., Tokyo* 65 (771/772), 1952 (245–50). 1 ref. [Jap.] I.M.I.

Synonyms, distribution and the chemical constituents of each species or variety are given in English and there are English legends to diagrams showing the relationship between the constituents, and the evolutional relationship between the species and varieties.

125. HALL, N., and JOHNSTON, R. D. **The field identification of Eucalypts.** *Unasylva* 7 (2), 1953 (64–9). 11 refs.

Describes and illustrates a card-sorting system in which 75 features are coded, for the identification of Eucalypts.

126. WORTHINGTON, T. B., and GORRIE, R. M. **Notes on Eucalypts in Ceylon.** *Ceylon Forester* (*n.s.*) 1 (2), 1953 (112–22). 11 refs.

Gives a key for the identification of some 55 species that have been planted in Ceylon.

127. MARSH, E. K. **How to distinguish between *Eucalyptus saligna* Sm. and *Eucalyptus grandis* (Hill) Maid.** *J. S. Afr. For. Ass.* No. 23, 1953 (37–44). 8 refs.

The historical background to the recognition of *E. grandis* as a species distinct from *E. saligna* is examined with a view to showing that there is a probability of hybridization having occurred between them in the Australian zone in which they intermingle. This is claimed to be the cause of the confusion surrounding the identification of these species and it is averred that the botanical descriptions of Baker and Smith and of Blakely are to be preferred to that of Maiden in this instance. The distinguishing features between these species are discussed, as well as possible practical advantages of cultivating pure strains. *Author's summary.*

128. TODD, M. A. **The types of *Eucalyptus paniculata* SM. and *E. siderophloia* Benth. and their probable relationships.** *Kew Bull.* 1953 (2) (191–205).

An investigation of the types of these species, in order to clear up some uncertainty in the interpretation of the names, showed that these are being more or less misapplied. It appears that hybrid complexes are associated with each of these names, and that these hybrid complexes are interlinked.

129. GARDNER, C. A. **Trees of Western Australia. 16. The Coolabah (*Eucalyptus microtheca* F. Muell). 17. The Grey Box (*Eucalyptus tectifica* F. Muell).** *Leafl. Dep. Agric. W. Aust.* No. 2038, 1953. pp. 7. 4 photos.

Botanical descriptions.

130. KEAY, R. W. J. **Revision of the 'Flora of West Tropical Africa'.** *Kew Bull.* 1953 (2), (287–91).

Contains a description of *Syzygium staudtii*, hitherto only briefly described.

131. WYATT-SMITH, J. **The Malayan species of *Bruguiera*.** *Malay. Forester* 16 (3), 1953 (156–61 + 5 photos). 2 refs.

Includes field keys for the identification of 5 Malayan species—*B. gymnorrhiza, B. eriopetala, B. hainesii, B. parviflora* and *B. cylindrica.*

18. PLANT ECOLOGY

See also No. 57.

132. BOYKO, H. **Arid zone programme: a report on plant ecological research in Iran, Israel and Turkey.** Unesco, Paris. Unesco/NS/AZ/105, 1952. pp. 37. 491 refs. Limited distribution.

Cf. *For. Abstr.* 15 (No. 36).

181. *Mode of Life, Autecology. Silvicultural Characters of Trees*

See also Nos. 509, 599.

133. MCVEAN, D. N. **Biological flora of the British Isles: *Alnus* Mill.** *J. Ecol.* 41 (2), 1953 (447–66). 46 refs.

The ecology of the only British species, *A. glutinosa.*

134. PILLAI, A. K. **Notes on [the silvicultural characters of] Palu (*Manilkara hexandra*, Dubard.).** *Ceylon Forester* (*n.s.*) 1 (2), 1953 (78–9).

181.1. Distribution, Natural Range

See also Nos. 141–2.

135. ANDERSEN, H. E. **Range of Western Redcedar (*Thuja plicata*) in Alaska.** *Tech. Note Alaska For. Res. Cent.* No. 22, 1953, pp. 1 + 1 map. 3 refs.

136. SEVIM, M. Lübnan sedirinin (*Cedrus libani* Barr.) Turkiyedeki Tabiî yayılışı ve ekolojik şartları. **[The natural distribution and site conditions of *C. libani* in Turkey.]** *Istanbul Üniv. Orm. Fak. Derg.* 2*A* (2), 1952 (19–46 + 12 photos, 1 map). 55 refs. [Turk.g.]

Discusses: the distribution of *C. libani* in the Taurus region, mainly between 36° 16′ and 38° 05′ N. and 29° 02′ and 37° 19′ E., in the winter-hardy dry forest zone, 1300–2100 m. above sea level, characterized by cold winters with much snow and hot dry summers; natural regeneration; and soil characteristics; and gives some growth measurements based on sample trees. *From author's summary.*

137. LEROY, J.-F. Notes géographiques sur les noyers tropicaux (*Juglans* et *Carya*). **[Geographical notes on tropical *Juglans* and *Carya* spp.]** *Rev. int. Bot. appl. Agric. trop.* 33 (367/368), 1953 (221–5). 4 refs. [F.] P.R.

The distribution of tropical *Juglans* spp. in America and of *Carya* spp. in Asia is shown on maps, and the distribution in Asia of *Annamocarya sinensis, C. poilanei, C. tonkinensis* and *C. cathayensis* is discussed in some detail.

138. FENAROLI, L. Note su l'ecologia e la distribuzione dei pioppi in Italia. **[Notes on the ecology and distribution of [indigenous] Poplars in Italy.]** *Suppl.* to *Ann. Sper. agr.* 7 (2), 1953. pp. 36. [It.it.e.]

Gives distribution in Italy and ecological characters of 17 indigenous species, varieties, and hybrids, with numerous drawings to illustrate leaf shapes.

181.2. Atmospheric Relations. Acclimatization

See Nos. 87, 147, 205, 209–10.

181.3. Water, Soil and Root Relations (including Bacterial and Mycorrhizal Symbiosis)

See also Nos. 11–2, 18–21, 31, 71, 80, 233, 236–7, 350, 357.

139. Morozov, V. F. Osobennosti vodnogo i uglevodnogo obmenov sosny krymskoĭ i obyknovennoĭ na Nižnedneprovskih peskah. **[Features of the water and carbohydrate régimes of Crimean and Scots Pines on the Lower Dnieper sands.]** *Dokl. Akad. Nauk SSSR* 90 (1), 1953 (105–8). 6 refs. [Russ.] A.P.B.

Gives the results of studies made in August 1950 and May–August 1951 on trees of the two species in shelterbelt plantations on these sands in the Ukraine [cf. *For. Abstr.* 13 (No. 2883)]. Foliage moisture content and transpiration rates were measured (rapid weighing of cut branchlets) thrice daily on various days within these periods, and in 1951 the carbohydrates of the foliage were analysed on different dates by Bertrand's method. Some root systems were also excavated in late summer, 1950. No significant difference in m.c. of foliage existed between the species. One-year-old foliage had a m.c. ca. 10% higher than 2-year-old. The transpiration rate of *P. sylvestris* averaged 1·3 times that of *P. nigra* var. *caramanica*, and its active root system (roots < 2–3 mm. diam.) was larger and more ramified, having ca. 10·2 cm. of fine roots per 1 g. of fresh foliage, compared with 5·7 cm. for the latter. In *P. sylvestris*, however, almost 90% of the roots lay in the top 30 cm. of soil, whereas in *P. nigra* var. *caramanica* ca. ¼ of the root system lay at 60–80 cm. depth. As might be expected, the latter species was consequently found to suffer less from drought. The foliage analysis showed that in *P. nigra* var. *caramanica* sucrose and starch, but in *P. sylvestris* monosaccharoses, predominated in the day-time, the former having the higher photosynthetic activity and appearing in general better adapted to the unfavourable conditions of this habitat.

140. Puri, G. S. **The amount of foliar ash in Sal (*Shorea robusta* Gaertn.) trees of different quality classes in India.** *J. Indian bot. Soc.* 31 (1/2), 1952 (82–6). 12 refs. O.B.D.

The investigation was undertaken to discover any possible differences in leaf-ash quantities of *S. robusta* of different quality classes, and to see whether such data throw any light on the non-exacting nature of this species. There were significant increases in leaf ash from qualities I to III, but quality IV shows a decrease. The results confirm that *S. robusta* is a non-exacting species, developing best on non-calcareous acidic soils, but that too acid a soil is unfavourable to it. [Cf. *For. Abstr.* 12 (Nos. 1808, 2838).]

141. Hewetson, C. E. **A discussion of the ecological position of Sal (*Shorea robusta*) in Central India.** *Indian For.* 79 (6), 1953 (310–20 + 4 photos). 13 refs.

The main distribution in central India is probably controlled by climate, but within its range the distribution depends mainly on edaphic factors. It is pointed out that no simple explanation in terms of physical or chemical factors is adequate, and research into the water economy and nutrient uptake of Sal is recommended as the most likely line for progress.

142. Khan, M. A. W. **Effects of geological formations on the distribution of Sal (*Shorea robusta*), in Madhya Pradesh forests.** *Indian For.* 79 (9), 1953 (463–74 + 1 map). 13 refs.

A study of Sal in South Raipur forests (data tabulated) suggests no definite correlation between the underlying rocks and the occurrence of Sal forest. In this area, at least, distribution of Sal appears to be governed by soil moisture.

143. Weck, J. Weisstanne I u. II Generation nach Acker und Heide in Lütetsburg/Ostfriesland. **[First- and second-generation Silver Fir on agricultural and heath land in Lütetsburg, eastern Friesland.]** *Forstwiss. Cbl.* 72 (5/6), 1953 (148–59). 1 ref. [G.g.]

In order to examine possible slackening of growth in 2nd-generation stands of *Abies alba*, comparative studies were made of humus cover, ground flora, growth and form of trees in 1st- and 2nd-generation stands on (1) soil previously under agricultural crops, and (2) former heathland. Height increment proved to be better in the 2nd generation than in the 1st. With increasing age *A. alba* shows increasing irregularity in growth rings, reflecting a growth crisis which appears to be due to an unfavourable development of topsoil, for a favourable reaction was observed to thinning and soil improvement. On similar sites Douglas Fir shows no such growth crisis. It is concluded that pure stands of *A. alba* are not suitable for this region, though it may usefully be grown in mixture with other species. Frequent and heavy thinnings are necessary. Good results would be obtained from mixed Douglas and Silver Fir stands from which, after the age of 70, the Douglas Fir would gradually be removed, and the soil worked over and dressed with lime.

144. Stevenson, G. B. **Bacterial symbiosis in some New Zealand plants.** *Ann. Bot.* (*n.s.*) 17 (66), 1953 (343–5 + 1 plate). 4 refs. O.R.E.

A large number of species of *Coprosma* show bacteria-containing stipular nodules. Hairs which contain bacteria are also present. In other species, e.g. *Myoporum laetum* and *Eucalyptus* spp., bacteria are present in superficial and immersed leaf glands. It is suggested that the bacterial symbionts may function in the fixation of atmospheric N, and so be important to the plants when growing in N-deficient soils. *From author's summary.*

145. Ferguson, T. P., and Bond, G. **Observations on the formation and functions of the root nodules of *Alnus glutinosa* (L.) Gaertn.** *Ann. Bot.* (*n.s.*) 17 (65), 1953 (176–88 + plate). 15 refs. O.R.E.

Nodule-bearing Alder can grow vigorously in water culture without any external source of combined N. Evidence is advanced to show that

the fixation of atmospheric N thus implied occurs within the nodulated plant, and probably in the nodules. When plants were artificially inoculated with the nodule organism, nodules were most freely formed over the pH range 5·4 to 7·0. Subsequent to nodulation the growth of plants was better at pH 5·4 than at higher values, and was also satisfactory at pH 4·2. Forced aeration of water culture markedly increased the growth of nodulated plants, but had no effect on non-nodulated plants supplied with combined N. The nodules appear to have higher O requirements than the roots. Fixation of N per unit dry weight of nodule tissue in Alder is comparable with or greater than that of legumes, and the fixation of N per plant by Alder in its first season exceeds that of various legumes. *From authors' summary.*

146. Levisohn, I. **Growth response of tree seedlings to mycorrhizal mycelia in the absence of a mycorrhizal association.** *Nature, Lond.* 172 (4372), 1953 (316–7). [Bedford College, London.]

Pot-culture experiments in which *Chamaecyparis lawsoniana* was raised in soil inoculated with *Rhizopogon luteolus* have demonstrated that mycelium known to produce ectotrophic mycorrhizae can stimulate the growth of an endotrophic tree species although it does not form an association with the roots. Further experiments are in progress.

147. Richardson, S. D. **Studies on root growth in *Acer saccharinum* L. II. Factors affecting root growth when photosynthesis is curtailed.** *Proc. ned. Akad. Wet.* 56*C* (3), 1953 (346–53). 5 refs. [E.e.] O.R.S.

[Cf. *For. Abstr.* 14 (No. 3167).] When light intensity was reduced from 5000 to 2000 or 200 luxes, or shoot temperature from 20 to 5° C., root growth fell rapidly to a very low level but after about 7 days increased gradually to reach 50–60% of the original value. At this level, variation in shoot temperature had no further effect on root growth. Defoliation, decapitation, or ringing below the level of the lowest bud, caused root growth to stop completely. When new leaves developed on defoliated plants, new roots developed also and neither changes in shoot temperature from 30 to 5°, nor in light intensity from 5000 to 200 luxes, had any significant effect on growth rate of these roots. These results indicate that when photosynthesis is curtailed, root growth proceeds at the expense of storage products in the roots but that the leaves supply an essential stimulus to root formation and growth.

148. Vogdt. Zur waldbaulichen Bedeutung der Wurzelkonkurrenz. Bericht über einen Versuch in Niedersachsen. **[The silvicultural significance of root competition. Report on an experiment in Lower Saxony.]** *Forst u. Holz* 8 (16), 1953 (236–8). [G.]

A group of young, suppressed Pines were freed from the root competition of surrounding older trees by means of an encircling trench. The stand was on dry soil and a trench one spit deep sufficed to sever the roots, which were mostly superficial. Height increment measurements, made for 2 years after the release, showed a definite increase in the released Pines.

181.4. Reaction to Biotic Influences (Competition etc.) and Fire

See also Nos. 148, 166, 187, 200, 233, 378.

149. Černoga, J. Vpliv požara na semenitev bukve. **[Influence of a forest fire on the seed-bearing of Beech.]** *Gozd. Vestn.* 11 (4), 1953 (121–2). [Sloven.]

An even-aged pure Beech stand severely damaged by fire in 1949 produced seed in 1950, whereas most Slovenian Beech stands had mast years in 1946 and 1951 only.

181.5. Reproductive Behaviour

See also Nos. 5, 84–6, 99–100, 149, 175, 193 *et seq.*

150. **[Natural regeneration of *Oxytenanthera abyssinica* after gregarious flowering.]** *Rep. For. Dep. N. Rhod. 1952*, 1953 (6–7).

O. abyssinica, which flowered and died throughout N. Rhodesia in 1951, showed widespread seedling regeneration in 1952, almost all of it confined to termite mounds.

151. Godman, R. M. **Seed dispersal in southeast Alaska.** *Tech. Note Alaska For. Res. Cent.* No. 16, 1953. pp. 2.

Tabulated figures show the rate of dispersal of the 1951 seed crop of Sitka Spruce (5 lb./acre) and Western Hemlock (86 lb./acre), September 1951–November 1952. Nearly 78% of the Spruce and 59% of the Hemlock seed was released in October 1951, and by March/April 1952 99% of the seed of both species had been released. The last seed of the Spruce fell in October and of Hemlock in November 1952. Measurements were made in the Tongass national forest in a typical climax pulp-timber stand consisting of 86% Hemlock and 14% Spruce by volume.

152. **Rodent seed storing aids Pine reseeding.** *Timberman* 54 (11), 1953 (95).

Studies on the Gilchrist Timber Company's tree farm in N. Klamath County, California, showed that rodents planted an average of 2900 clumps/acre, each containing 2–27 seedlings, while there were 400 single seedlings/acre arising from natural seedfall. A survey of clumps 3- to 6-ft. tall of rodent origin showed that a figure of 240/acre was not uncommon.

181.6. Life Form, Habit. Post-Seedling Development and Form

See also Nos. 107, 251, 356.

153. Trotter, A. La fisionomia degli alberi e la plasticità del faggio. **[The growth habit of trees and the plasticity of Beech.]** *Monti e Boschi* 4 (8), 1953 (339–48). 35 refs. [It.f.e.]

Discusses the variation of growth habit in trees, with particular reference to Beech, in relation to both environment and genetic constitution.

154. Solovjev, F. A. Samoprivivki kedra k sosne na Urale. **[Natural grafts of *Pinus sibirica* on to *P. sylvestris* in the Urals.]** *Priroda, Moskva* 42 (3), 1953 (93–5). [Russ.] A.P.B.

Describes two cases and mentions reports of others.

181.8. Phenology

See also Nos. 75, 150.

155. Molotkovskiĭ, G. H., and Molotkovskiĭ, Ju. G. Novyĭ metod snjatija perioda pokoja u drevesnyh rasteniĭ. **[New method of breaking dormancy in woody species.]** *Dokl. Akad. Nauk SSSR* 90 (1), 1953 (101–4). 4 refs. [Russ.] [Černovickiĭ Gosudarstvennyĭ Universitet.] A.P.B.

Experiments with potted seedlings of *Quercus robur*, *Q. borealis* and *Juglans regia* held upside-down, and with cut branches of other woody species (*Tilia cordata*, *Fagus sylvatica*, *Liriodendron tulipifera*, Apple, Pear and Lilac) with their bases in water but bent so that their apices were upside-down—all in a warm greenhouse (15–18° C.) at various times during the dormant season—showed that reversal of the natural direction hastened the breaking of dormancy. The effect was the less, the nearer the time of inversion to that of natural flushing. Bark ringing of some of the specimens so treated appeared to delay flushing of the inverted plants but to hasten it still more in the cut branches. Further experiments are to be made.

156. Palini, A. M. Osservazioni sul ritmo vegetativo di *Olea europaea* L. nel territorio di Camerino (Marche) nell'anno 1951. **[The growth cycle of *Olea europaea* in the Camerino district in 1951.]** *Nuovo G. bot. ital.* (*n.s.*) 59 (1), 1952 (106–18 + 4 photos). 3 refs. [It.it.e.] A.P.B.

181.9. Miscellaneous [including Ecological Rôle after Death of Plants or Parts of Plants (but for Litter see Section 114.3)]

See Nos. 12, 33.

182. *Synecology, Plant Sociology: General, Principles and Methods*

157. Drees, E. M. Enkele hoofdstukken uit de moderne plantensociologie en een ontwerp voor nomenclatuurregels voor plantengezelschappen. **[Capita selecta from modern plant sociology, and a design for rules of phytosociological nomenclature.]** *Rapp. Bosbouwproefsta., Bogor* No. 51, 1951. pp. 218. [Du.]

Cf. *For. Abstr.* 13 (No. 2853).

182.1. Palaeoecology. History of Vegetation

See also Nos. 166, 986.

158. Tallantire, P. A. **Studies in the post-glacial history of British vegetation. XIII. Lopham Little Fen, a late-glacial site in central East Anglia.** *J. Ecol.* 41 (2), 1953 (361–73). 35 refs.

Cf. *For. Abstr.* 13 (No. 2854).

159. Hansen, H. P. **Postglacial forests in the Yukon territory and Alaska.** *Amer. J. Sci.* 251 (7), 1953 (505–42). 38 refs. [Oregon State College, Corvallis.] O.R.S.

Lodgepole Pine and Spruce are found predominantly in pollen analyses, with *Betula papyrifera* significantly represented in some districts; *Populus tremuloides*, very abundant at present, is not represented in the sections because its pollen is poorly preserved. Climatic trends are not clearly expressed, and chronology is indefinite.

160. Allard, H. A., and Leonard, E. C. **The Canaan and Stony River Valleys of West Virginia, their former magnificent Spruce forests, their vegetation and floristics today.** *Castanea* 17 (1), 1952 (1–60).

161. Frey, D. G. **Regional aspects of the late-glacial and post-glacial pollen succession of south-eastern North Carolina.** *Ecol. Monogr.* 23 (3), 1953 (289–313). 31 refs.

162. McInteer, B. B. **Original vegetation in the Bluegrass Region of Kentucky.** *Castanea* 17 (4), 1952 (153–7). 12 refs.

Brief notes on information obtained from early writers concerning the original vegetation of this region.

163. Potzger, J. E. **The forest primeval of Indiana as recorded in the original United States Land Survey.** *Abstr.* in *Proc. Indiana Acad. Sci.* 61, 1951 (1952), (70). A.P.B.

The survey, which took place from 1799–1839, indicates that the primeval forest was chiefly of the mixed mesophytic type, in which Beech, several Ash species and *Acer saccharum* play a major part.

164. Potzger, J. E. **History of forests in the Quetico-Superior country from fossil pollen studies.** *J. For.* 51 (8), 1953 (560–5). 11 refs.

165. Sharp, A. J. **Notes on the flora of Mexico: world distribution of the woody dicotyledonous families and the origin of the modern vegetation [of Mexico].** *J. Ecol.* 41 (2), 1953 (374–80). 11 refs.

Although about ¾ of Mexico has temperate vegetation, the tropical areas have a richer flora with many more families, genera, and species. The present temperate flora of Mexico must have come in from the north during late Pliocene and the Pleistocene. *From author's summary.*

182.2. Succession, Alternation and Periodicity in Vegetation

See also Nos. 179, 380.

166. Day, G. M. **The Indian as an ecological factor in the northeastern forest [of the U.S.A.].** *Ecology* 34 (2), 1953 (329–46). 4 pp. of refs.

167. Giordano, E. La diffusione del pino marittimo nei castagneti dei Monti Pisani. **[The spread of *Pinus pinaster* in the Chestnut stands of the Monti Pisani.]** *Ital. for. mont.* 8 (3), 1953 (123–5). [It.f.]

Pinus pinaster is succeeding *Castanea sativa* in stands attacked by Chestnut ink disease. It is probable that these sites were formerly occupied by Pine, and that the disease and the neglect of the Chestnut stands have combined to favour it again.

182.3. Units of Vegetation (Associations etc.)

See No. 170.

182.4. Layer Communities

See also Nos. 18, 33.

168. Corti, R. Erborizzazioni in una lecceta sulla scarpata orientale delle Murge tra Fasano e

Locorotondo. **[The ground flora in a *Quercus ilex* stand on the eastern scarp of the Murge between Fasano and Locorotondo.]** *Nuovo G. bot. ital. (n.s.)* 59 (1), 1952 (144–56 + 4 photos). 5 refs. [It.it.e.] A.P.B.

169. HALE, M. E. **Phytosociology of cryptogams in the hardwoods of southern Wisconsin.** *Abstr.* in *Bull. ecol. Soc. Amer.* 33 (3), 1952 (59). A.P.B.

182.5. Synecological Measurements and Methods

See also No. 18.

170. GOODALL, D. W. **Objective methods for the classification of vegetation. I. The use of positive interspecific correlation.** *Aust. J. Bot.* 1 (1), 1953 (39–63). 21 refs. O.B.D.

It is argued that correlations between the presence or quantity of different species recorded in quadrats imply heterogeneity in the vegetation in which the quadrats are placed. If the quadrat data can be so divided that within each subdivision no interspecific correlations occur, these subdivisions represent elementary classification units of the vegetation, and an objective classification may be arrived at if methods can be found of satisfying this requirement Four procedures are described for dividing a set o quadrat data into groups satisfying the above criterion of homogeneity. The simplest and apparently the most satisfactory consists in finding the most frequent species showing significant correlations with others, and separating in the first instance all quadrats containing this species. Within this group correlations are again tested, and the process is repeated until a group with no significant correlations has been extracted. All other quadrats are then lumped together and the process is begun again from the beginning. When the whole collection of quadrat data has been divided in this way into homogeneous groups, these groups are recombined where this can be done without the resulting larger group showing interspecific correlations. The 4 procedures suggested are illustrated on data from a small area of the Victoria Mallee. Some of the results suggest that classification is an inappropriate method of dealing with variation in this type of vegetation, and that a coordinate treatment might be more suitable. *Author's summary.*

171. CETNER, L. Logarytmiczny wykres występowania (frekwencji) gatunków drzew w drzewostanie. **[Logarithmic frequency graph of tree species in a stand.]** *Sylwan* 97 (2), 1953 (106–8). [Pol.]

Recommends using semi-logarithmic graph paper for plotting the (logarithmic) volumes of different stand constituents in terms of d.b.h., to enable even the smallest admixtures to be shown. Alternatively, the numbers of stems can be plotted if the distances between successive d.b.h. abscissae are made to correspond to the average tree volume of the given class.

187. *Vegetation Types*

See also Nos. 7, 30, 106, 170, 187, 243, 551.

172. MATUSZKIEWICZ, W. Zespoły leśne Białowieskiego Parku Narodowego. **[Forest communities of the National Park of Białowieża.]** *Ann. Univ. M. Curie-Skłodowska, Lublin (Ser. C)*, Suppl. VI, 1952. pp. 218 + 1 dgm. + 8 tbls. 70 refs. [Pol.russ.g.]

Presents results of research in the field and laboratory, including phytosociological and soil analyses. The accepted classification of phytosociological units is that of the French/Swiss school (Braun-Blanquet, Tüxen, Moor). The following associations were distinguished in the Białowieża forest: (1) *Sphagnetum medii pinetosum*, (2) *Salix aurita—Frangula alnus*, (3) *Alnetum glutinosae*, (4) *Fraxineto-Alnetum*, (5) *Querceto-Carpinetum medio-europaeum* (with 4 sub-associations), (6) *Querceto-Betuletum* (2 sub-associations), (7) *Pineto-Vaccinietum myrtilli*, and (8) *Betuletum pubescentis ledetosum silvestris.*

173. CORONA, E. La Val Noana: osservazioni botaniche e forestali. **[Botanical and forestry notes on the Val Noana.]** *Monti e Boschi* 4 (6), 1953 (262–71). 7 refs. [It.f.e.]

Gives the results of a floristic and ecological survey of a typical alpine valley in the Dolomites.

174. KASAPLIGIL, B. Türkiyede Akdeniz iklim tipinin hakim olduğu bölgelerde orman vegetasyonu. **[The forest vegetation in the Mediterranean regions of Turkey.]** *Istanbul Üniv. Orm. Fak. Derg.* 2 (2), 1952 (47–65). 9 refs. [Turk.E.]

Describes the climate and vegetation of the Mediterranean, Aegean and Marmara regions.

175. NÈGRE, R. Observations phytosociologiques et écologiques sommaires sur la cédraie de Kissarit (Brigade forestière d'Ain Leuh, Moyen Atlas Central). **[Brief phytosociological and ecological observations on the Cedar forest of Kissarit (Forest District of Ain Leuh, central Middle Atlas range).]** *Phyton, Annales Rei Botanicae, Horn, N.–Ö.* 4 (1/3), 1952 (59–71). 5 refs. [F.f.] O.B.D.

Below an altitude of 1650 m. the forest is classed as *Quercetum ilicis*, and above this altitude as *Cedreto-Quercetum ilicis.* The latter is found on dolomitic limestone, with or without a clay accumulation. On the dolomite soils regeneration is good. On the clay soils which support a *Brachypodietum pinnati* community, regeneration is abundant; where a *Festucetum yvesianae* community is found, it is absent.

176. ELLIOTT, J. C. **Composition of upland second growth hardwood stands in the tension zone of Michigan as affected by soils and man.** *Ecol. Monogr.* 23 (3), 1953 (271–88). 52 refs.

177. ELLIOTT, J. C. **The phytosociology of the upland second growth hardwoods of Missaukee County, Michigan.** *Abstr. of thesis*, in *Dissert. Abstr.* 13 (1), 1953 (7–8). [Michigan State College.] O.R.S.

178. GILBERT, M. L., and CURTIS, J. T. **The understorey continuum of the upland hardwoods of southern Wisconsin.** *Abstr.* in *Bull. ecol. Soc. Amer.* 33 (3), 1952 (59–60). A.P.B.

179. MCINTOSH, R. P. **A study of physical environment and forest succession in the upland forest continuum of the prairie-forest border region of Wisconsin.** *Abstr.* in *Bull. ecol. Soc. Amer.* 33 (3), 1952 (60). A.P.B.

180. NICHOL, A. A. **The natural vegetation of Arizona**. *Tech. Bull. Ariz. agric. Exp. Sta.* No. 127, 1952 (187–230). 5 refs.
Revision of *Tech. Bull.* No. 68.

181. ALVIM, P. DE T., and ARAUJO, W. A. El suelo como factor ecológico en el desarrollo de la vegetación en el centro-oeste del Brasil. **[The soil as an ecological factor in the development of vegetation in east central Brazil.]** *Turrialba* 2 (4), 1952 (153–60). 8 refs. [Span.span.e.] A.P.B.
In the Brazilian 'campos cerrados' (c.c.) there occur small islands of true forest, palm savanna or other associations wherein plants of the typical c.c. are not found. Vegetation and soils were studied in 10 different areas near the city of Belo Horizonte in Minas Gerais. Three of these areas supported typical c.c. vegetation, 3 supported grass and *Acrocomia* sp., 2 had a forest cover, 1 carried grassland with a few trees, and 1 carried a type of vegetation designated as 'campo sujo' (a secondary association). Typical c.c. vegetation was found only on soils extremely poor in exchangeable bases (especially Ca) and with a low pH. Forest or grassland with *Acrocromia* sp. were found only on soils with pH above 5·0 and relatively rich in Ca. Seedlings of *Phaseolus vulgaris* grown in 'cerrado' and 'sujo' soils showed marked symptoms of Ca deficiency but grew normally when $CaCO_3$ was added or when grown in soils from forest or palm savanna areas. The distribution of the c.c. therefore appears to depend more upon the soil than on other factors, and such soils could probably be improved by liming.

2. SILVICULTURE

182. BARRETT, L. I. **Impressions of European forestry**. U.S. Forest Service, Washington. 1952. pp. 12.
Impressions gained in a tour of Scandinavia and Germany.

183. SPURR, S. H. **Post-war forestry in Western Europe. Part II. Germany, Switzerland and France**. *J. For.* 51 (6), 1953 (415–21). 5 refs.

184. LYON, N. F. **Silvicultural research projects in northwestern Ontario**. *Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 1315 (*F*–2), [1953]. pp. 9.
Lists past and present research projects of a number of industrial concerns and government departments. A co-ordinating body (the Northwestern Ontario Committee on Co-ordinated Research) has been set up to establish a technical library, to prepare an annual review of research and to encourage meetings between bodies proposing similar research studies.

22. SILVICULTURAL SYSTEMS. CONSTITUTION AND COMPOSITION OF STANDS; FORMS OF STAND

221. *High Forest Systems*

See also Nos. 197, 351, 566, 577–8.

185. BOUDRU, M. Considérations sur la futaie jardinée de chêne. **[Oak selection forest.]** *Bull. Inst. agron. Gembloux* 20 (3/4), 1952 (155–77). 10 refs. [F.] E.M.B.
The author first points out that, like earlier writers on this subject, he has no factual data, since there are in fact no Oak forests managed as selection forest. He then proceeds to discuss (theoretically) the structure of such a forest, particularly the distribution of size classes, which he takes to follow a decreasing geometrical progression of fixed ratio (Liocourt's coefficient) like Fir and Beech stands and not to conform with Huffel's principle.

222. *Coppice, Pollarding and Lopping Systems*

See also Nos. 191, 201, 556.

186. PELÍŠEK, J. Půdni poměry nízkých lesů v oblasti Slovenska. **[Soil relations of the coppice forests in Slovakia.]** *Pol'ana* 8 (9), 1952 (171–3). [Cz.]
Describes the main forest soil types of Slovakia, and tabulates climatological data (mean monthly temperatures, and monthly precipitation) for 6 places situated in the lowland forest zone.

187. ZLATNÍK, A. Lesné typy a ekologické podmienky drevín nízkych lesov na Slovensku. **[Forest types and ecological conditions of trees of the coppice forests in Slovakia.]** *Pol'ana* 8 (9), 1952 (167–70). [Slovak.]
The author adduces the following causes for the transformation of the original forests of Slovakia into those of the present day: (*a*) reduction of the forest area; (*b*) change of the forest composition, exploitation, and the duration of the felling period, and (*c*) removal of forest litter and grazing. These causes are analysed and discussed for the main associations involved, viz. (1) floodland forest, (2) *Alnetum* on lowlands with high water-table, (3) *Quercetum* (mainly *Q. sessiliflora* and *Q. cerris*); (4) mixed broadleaved forest (*Querceto-Carpinetum* or *Acereto-Carpinetum*), and (5) *Fagetum quercetosum* and *Fageto-Quercetum*.

188. OKOLIČÁNY, D. Stav nízkych lesov a jeho vplyv na produkciu dreva. **[The condition of the coppice forests and its effect on timber production [in Slovakia].]** *Pol'ana* 8 (9), 1952 (192–3). [Slovak.]
Compares the timber production of coppice with that of high forest, emphasizing that timber yields from the former are inferior both in quantity and in the assortments obtainable.

189. SIGOTSKÝ, F., BEZAČINSKY, H., KRÉBES, G., and BROŽ, J. Pestebné úlohy a metodika prevodov nízkych lesov. **[Silvicultural problems and methods of conversion of coppice forests.]** *Pol'ana* 8 (9), 1952 (174–83). [Slovak.]
Reviews the present state of coppice forests in Slovakia and the need for their conversion to high forest, discusses the conversion methods so far used, and makes recommendations on the technique of conversion for a number of different types of stand,

viz. (1) *Quercus robur* (*s.l.*), *Q. cerris*, *Carpinus betulus*, *Fagus sylvatica* (both pure or in mixture with each other), (2) *Robinia pseudoacacia*, and (3) stands with a considerable proportion of self-sown Aspen, Birch etc. Some notes are included on tending, protection, and the planning of conversion.

226. *Changes of Silvicultural System. Conversion (by System or Species)*

See also Nos. 189, 276.

190. **Scrub Oak conversion.** *Rep. Ntheast. For. Exp. Sta. 1951*, 1952 (15–8).

In areas in the Pocono section of Pennsylvania, bulldozing shallow wide furrows in preparing planting sites was relatively cheap and effective and gave better results than scalping or than ploughing the entire area. Burning was useless for site preparation on an area burned 3 years earlier. Large planting stock generally gave better results than smaller stock. Results 4 years after planting indicate that Red Pine and Jack Pine are promising species, Scots Pine is a slow starter and is reputed to do poorly after about 40 years, European Larch is promising but gives very variable results, while Black Locust, White Pine and hybrid Poplar cannot be recommended.

191. VEENENDAAL, H. Hervorming van hakhout in opgaand eikenbos in Veenhuizen. **[Conversion of coppice into Oak high forest at Veenhuizen [N.W. Drente].]** *Ned. Boschb.-Tijdschr.* 25 (7/8), 1953 (200–6). [Du.]

Measurements of height, volume and increment and calculations of costs and values for Oak forest at Veenhuizen, converted from coppice between 1905 and 1920, show that the change-over has been profitable.

192. **Lowland forests.** *Rep. For. Dep. Cyprus 1952*, 1953 (11).

The programme of converting Acacia plantations on good bottomland sites to Eucalypt high forest was continued with excellent results. The old Acacia forests of low economic value are first cleared by bulldozing, and the area contour-banked to prevent erosion and secure maximum catchment and absorption of winter rainfall. After pit-planting with Eucalypts, the plantations are disked twice a year for 3–4 years until the trees are well established and the canopy begins to close. By these 'dry-farming' methods, plantations can be successfully established entirely without irrigation and at a cost of only £6—7 per donum.

228. *Constitution and Composition of Stands; Forms of Stand*

See Nos. 143, 171, 569.

23. REGENERATION AND FORMATION OF STANDS

231. *Natural Regeneration*

See also Nos. 115, 150–2, 175, 378, 439.

193. ANDERSON, M. L. **Pre-requisites for natural seeding.** *Quart. J. For.* 47 (3), 1953 (159–69).

Attention is drawn to some of the factors, other than ground game, which require to be considered when wishing to apply methods of natural regeneration. The utility of classifying tree species on an ecological basis is stressed, and the primary importance of the presence of parent trees of the desired species is pointed out. The effect of climatic factors on flowering, pollination, and seed-bearing is discussed, as well as the proportion of the sexes in the flowers, the periodicity of seed-years, and of the numbers and types of seed produced. Factors affecting the dispersal of the seeds and their arrival on the desired site are dealt with, and the importance of the nature of the soil in relation to germination and to the subsequent development of the seedlings. After-treatment of the seedlings and assisting them in their struggle with other vegetation are briefly touched upon. *Author's summary.*

194. MACDONALD, J. M., and LOCKHART, S. F. M. **Some early observations on the natural regeneration of conifers in Scotland.** *Scot. For.* 7 (3), 1953 (79–82, 85). 3 refs.

Observation has shown that a large amount of coniferous seed germinates in Scottish woods, and seedlings are seldom eaten until the first winter. Seedlings of *Picea sitchensis*, *Tsuga heterophylla*, *Thuja plicata*, *Abies grandis*, *A. procera*, and *Pseudotsuga taxifolia* come, almost without exception, from cones that have opened, or partially opened, and shed their seed while still on the trees. It is suggested that the almost complete absence of natural regeneration of *Picea abies* in Scotland may be due largely to its cones' not opening on the tree owing to the lack of strong sunlight. Sitka Spruce appears to be more accommodating in this repect and of the many cones examined on the ground in 1950, about half had opened and shed most of their seed before falling.

The chief enemy to conifer reproduction is the rabbit. The right conditions for regeneration of Sitka Spruce, and probably of other species, occur when the ground is covered by an equal mixture of raw humus and moss (often *Thuidium tamariscinum*), which occurs in about half light. It is considered that in these conditions adequate regeneration can be obtained at the expense of fencing against rabbits, which can probably be paid for by a previous or subsequent thinning or improvement felling.

195. GODMAN, R. M. **Moss retards regeneration in Southeast Alaska.** *Tech. Note Alaska For. Res. Cent.* No. 18, 1953. pp. 1.

Figures are given showing the number of seedlings and survival % for Hemlock, Spruce and Cedar on moss and on mineral soil.

196. MCCULLEY, R. D. **Natural regeneration of Loblolly Pine in the southeastern coastal plain.** *Sta. Pap. Stheast. For. Exp. Sta.* No. 26, 1953. pp. 14. 8 refs.

Discusses seedfall, seedbed preparation, co-ordinating seed supply with seedbed conditions by using cone crop forecasts or by stimulating seed production by release, and methods of ensuring seedling establishment.

197. WORTHINGTON, N. P. **Reproduction following small group cuttings in virgin Douglas Fir.** *Res. Note Pacif. Nthwest. For. Range Exp. Sta.* No. 84, 1953. pp. 5.

On 6 small group cuttings, regeneration of Douglas Fir or Hemlock was satisfactory on all areas within 5 years, while in a large clear-cut area it was satisfactory only within 500 ft. of the surrounding forest and below satisfactory at 500–1500 ft. from the forest edge. Burning favoured regeneration of both species, and disturbance of the site by skidding improved regeneration of Douglas Fir. Windfall was severe round the boundaries of the large clear-cut area, but negligible round the small areas.

198. ARIEF, O. S. M., and SOESILOWIDJOJO, R. A. Penjelidikan tentang permudaan alam (natuurlijke verjonging) dari djenis *Agathis borneensis* Warb. di sekitar Sampit (Kalimantan Selatan). **[The natural regeneration of *A. borneensis* at Sampit, S. Borneo.]** *Rimba Indonesia* 2 (1/2), 1953 (66–83). 8 refs. [Jav.e.]

Some data on the extent of existing forests and on dimensions and increment of trees are tabulated. Natural regeneration is recommended in view of labour problems and high costs. The measures necessary to ensure natural regeneration are: choice of suitable sites, retention of seed trees, shade for the young seedlings with gradual exposure to sunlight, removal of weeds and protection from fire.

199. CHAIKEN, L. E. **Annual summer fires kill hardwood root stocks.** *Res. Note Stheast. For. Exp. Sta.* No. 19, 1952. pp. 1.

After 5 consecutive annual winter fires no diminution of sprouting vigour of understorey hardwoods in the Loblolly Pine type of the S. Carolina flatwoods was observed. Tallies showed that about 50% of the small hardwood population was permanently eliminated by 4 consecutive summer fires and that the ground cover of tree and shrub species was reduced by ⅔ as compared with annual winter fires.

200. WENGER, K. F. **The sprouting of Sweetgum [*Liquidambar styraciflua*] in relation to season of cutting and carbohydrate content.** *Plant Physiol.* 28 (1), 1953 (35–49). 29 refs. O.R.E.

The investigations were undertaken in connexion with the reduction of hardwood competition with Pine. Ten trees were cut at 2-week intervals throughout the growing season, and detailed records of coppice growth kept. Another group was treated so that the first, second and third generation of coppice shoots could be compared at different times during the growing season. Observations of number, height and fresh weight of coppice shoots were made 1 year after final cutting in all groups. When the final observations were made, carbohydrate content was determined in stump and root-wood samples from all treated and some untreated trees. Coppicing vigour as expressed by height or weight of 1-year-old shoots followed a definite pattern according to date of cutting, with 2 minima, (1) when the leaves that had emerged earliest reached full size, and (2) during the late summer hardening period. Size and number of shoots was directly related to tree diameter, the larger trees producing larger and more shoots. The destruction of successive generations of shoots from the same stump during the same growing season caused a decline in shoot vigour. Under the conditions of these experiments, the size and number of shoots were not dependent on carbohydrate content.

201. TRUE, R. P. **Studies on sprout reproduction of Yellowpoplar [*Liriodendron tulipifera*] as related to decay.** West Virginia University Agricultural Experiment Station, Morgantown, W. Va. 1953. pp. 4. 7 refs.

A preliminary report on a project to study the incidence of decay in coppice regrowth of *L. tulipifera*.

232. *Artificial Regeneration*

232.1. Choice and Trial of Species, Races, etc.

See also Nos. 23–5, 143, 244–9, 277, 283, 291.

232.11. *Species Trials (by Localities), including Forest Gardens, Trials of Exotics etc.*

See also Nos. 190, 242–3, 276, 354, 954, 987.

202. DELSAUX, R. Le mélèze du Japon dans les régions de Chevron et de Jenneret. **[The Japanese Larch in the Chevron and Jenneret regions [of Belgium].]** *Bull. Soc. for. Belg.* 60 (6), 1953 (273–9 + 1 photo). [F.]

Notes on area of plantations, increment, yield etc.

203. AGOSTINI, R. Cenni storici sulla introduzione degli Eucalitti in Italia. **[Historical notes on the introduction of Eucalypts into Italy.]** *Ital. for. mont.* 8 (3), 1953 (117–22). 43 refs. [It.f.]

204. **[Trials of Eucalypts in N. Rhodesia.]** *Rep. For. Dep. N. Rhod. 1952*, 1953 (7).

Eucalypts all over the Territory, wherever planted (except on a few exceptionally rich sites), were attacked by a *Botrytis* fungus at the growing tips, and by termites at the roots. The genus *Eucalyptus* is clearly not suited to the *Brachystegia* woodlands of the Congo-Zambezi basin.

205. SHIGEMOTO, M. **[Comparison of the growth of 'Kaigansho' (*Pinus pinaster*) and 'Akamatsu' (*Pinus densiflora*) in Kyoto prefecture.]** *Scientific Reports of the Saikyo University, Kyoto: Agriculture* 2, 1952 (132–8). 3 refs. [Jap.e.] P.R.

Comparison of the growth of 18-year-old *Pinus pinaster* with that of 15-year-old *P. densiflora* which has invaded the stand of the former species shows that, while the height, diameter, and volume increments of *P. pinaster* are greater than those of the other species, yet an increasing proportion of *P. pinaster* trees are damaged by wind, insects and other agents.

206. MINCKLER, L. S. **Success of planted Pine varies with species and site.** *Sta. Note Cent. St. For. Exp. Sta.* No. 76, 1953. pp. 2.

Loblolly and Shortleaf Pines on clay-pan soils in Southern Illinois showed good survival, growth and yield at 13 years and were straight and clean enough to produce reasonable amounts of pitprops, poles, piling or sawtimber. Pitch Pine had good

survival and fair growth but was too bushy, branched and crooked to give anything but Christmas trees or ornamental branches. Pitch Pine from 1 + 1 stock not only had much better yields, but was straighter and less branched than trees from 1 + 0 stock; the seed sources are not known. For the other species there was little difference between trees from 1 + 0 and 1 + 1 stock. Survival and growth were poorer on shallow poorly drained soils to the east of the area planted.

207. **[Introduction of exotic species into the Seychelles.]** *Rep. Dep. Agric. Seychelles 1952*, 1953 (19–20).

Cedrela odorata and *Swietenia mahagoni* have shown remarkably good growth on choice sites, and the latter has also done well, so far, on sites where indigenous species have done badly. Other species that have germinated well and give promise of good growth are *Cedrela mexicana*, *Swietenia macrophylla*, *Ochroma lagopus* and *Cinnamomum camphora*. *Melia dubia*, introduced some 15 years ago, now has a g.b.h. of 8 ft. and a clear bole length ca. 40 ft. and is regenerating itself profusely.

232.12. *Races and Provenance Trials*

See also No. 480.

208. ROBAK, H. På jakt etter gode lerkeraser for lavlandet og kyststrøkene. **[In search of good Larch races for the [Norwegian] lowland and coastal areas.]** *Tidsskr. Skogbr.* 61 (5), 1953 (171–91).

Describes a tour through Austria, Switzerland, France and Germany. It is concluded that many localities with climate similar to that of Norwegian coastal districts are to be found, particularly on the lower mountain slopes from Upper Austria to Salzburg and in the neighbourhood of Berchtesgaden, in parts of Vorarlberg and in Prätigau and the Bex district of Switzerland. Trials with Larch from these districts, and with existing Norwegian stock are recommended for the coast from Trøndelag to the Swedish border and for E. Norway.

209. STEFANSSON, E. Preliminära resultat av proveniensförsök med gran utlagda av Kramfors AB. **[Preliminary results of provenance trials with Norway Spruce established by Kramfors AB.]** *Norrlands SkogsvFörb. Tidskr.* 1953 (2), (335–66). 27 refs. [Sw.]

Four lots of seed ('standard provenances') from lower-lying districts (51–100, 101–150, 151–200 and 200–250 m. respectively) were sown in 1943–44 with seed from conditions corresponding as closely as possible to the experimental sites ('local provenances'), on 12 sites at 225 to 500 m. altitude. Temperature and rainfall data for the original and the experimental sites are tabulated. Examinations were made every summer, and tabulated figures are given showing plant height for the different provenances and sites, with graphs showing comparative heights of the former in 1952, and the average heights at 6–9 years for 'local' and 'standard' provenances on the different sites. Results show that the latter, during the first 9–10 years, have equalled the 'local' provenances, whose average heights, indeed, were somewhat less on most sites.

Comparison with Swiss experience [cf. *For. Abstr.* 13 (No. 219)] suggests that future development may be equally favourable.

232.13. *Trials of Hybrids and Other Products of Tree Breeding*

See also No. 101.

210. LORENZ, R. W., and SPAETH, J. N. **The growth of two hybrid Pines tested in Southern Illinois.** *For. Note Ill. agric. Exp. Sta.* No. 38, 1953. pp. 2. 2 refs.

Test sowings of (1) *Pinus rigida* × *P. taeda* and (2) *P. echinata* × *P. rigida* gave no evidence of hybrid vigour, and (2) is considered worthless for Illinois conditions. (1) gave plants of reasonably good form and noticeably more frost-hardy than *P. taeda* or *P. echinata*.

211. SAATÇIOGLU, F. Die Bedeutung des Pappelholzes und über Anbauversuche mit raschwüchsigen Pappelbastarden in der Türkei. **[The importance of Poplar wood and silvicultural research on quick growing Poplar hybrids in Turkey.]** *Schweiz. Z. Forstw.* 104 (7/8), 1953 (289–96 + 1 plate). [G.g.f.]

The importance of Poplar for the pulp industry is stressed. Clones imported from Italy (*P. euramericana* IT 214 ♀ and 154 ♂) have been widely used. The pulp industry has now developed a new clone named *P. euramericana* Turkey Sümer I ♂, which is said to give good results. Growth data are given for these three clones.

232.2. Preparatory Work, Auxiliary Measures

See also Nos. 190, 192, 234, 236, 240.

212. SHOOBRIDGE, D. W. **Mechanical clearing and ground preparation for softwood plantations in the Australian Capital Territory.** *Aust. For.* 15 (2), 1951 (105–9 + 6 photos).

The methods described include (1) pulling down the existing Eucalypt forest by tractors and cable, (2) piling and burning the pulled-down trees and scattering the ashes by bulldozer, and (3) preparing the soil by ripping with a Le Tourneau Model H5 rooter drawn by a Caterpillar D7 tractor. This technique is considered very satisfactory for plantation establishment in areas with an annual rainfall of less than 25 in. and with slopes not greater than 15°. The main advantages include a better initial 'take' of the planted Pines; better growth and vigour during the first few years; reduction of run-off and evaporation, owing to the roughened surface of the ground; minimum regrowth of Eucalypts; easier access for tending and utilization of the crop; and provision of a cleaner forest floor, which greatly simplifies fire protection. Ripping is also more satisfactory than normal ploughing for preparing open grassland for planting in low-rainfall areas.

213. LAURÝN, M. Mechanisací ke zdolání kalamitních holin. **[Mechanization helps in reforesting areas denuded by natural causes.]** *Lesn. Práce* 32 (1), 1953 (23–7). [Cz.]

Illustrated description of a forest plough 'Velky Eman', the essential part of which is a rotary disk-cutter, 55 cm. diam., weighted on both sides, its

total weight being ca. 40 kg. This cutter, mounted on ball-bearings, cuts through turf and hoists the plough over obstacles. The ploughshare is of double-bladed type. A soil-loosener is provided behind the plough proper. Tests with the plough, in November 1951 and spring 1952, are described in some detail. It is claimed that it can be very advantageously used for soil preparation in reforesting areas denuded of trees by natural catastrophes.

232.3. Seed, Nursery Practice, Direct Sowing

232.31. *Seed*

232.311. Seed Production (Seed Years, Seed Crops; Seed Orchards and Methods of Inducing Seed Production)

See also Nos. 149, 196, 430.

214. FINNIS, J. M. **A note on the bud count method of forecasting cone crops of Douglas Fir.** *For. Chron.* 29 (2), 1953 (122–7 + 2 photos). 1 ref.

In 1941 G. S. Allen described a method of forecasting cone crops of certain coniferous species [cf. *For. Abstr.* 3 (pp. 298–9)] by a bud count. In 1949 a small-scale trial of the method was made on second-growth Douglas Fir. It was found that the buds due to mature in the following year could be identified in November. The ratio of ♀ flower buds to vegetative buds ('cone intensity') is a measure of the cone crop to be expected in the following year. The practical value of the forecast is reduced by the time taken to make the bud count and the many problems involved in obtaining an adequate and accurate sample. *From author's summary.*

215. WENGER, K. F. **The effect of fertilization and injury on the cone and seed production of Loblolly Pine seed trees.** *J. For.* 51 (8), 1953 (570–3). 7 refs.

Partial girdling of seed trees had no effect on seed production. A single application of 25 and of 50 lb. of complete fertilizer, spread round the tree to 2 ft. beyond the edge of the crown, significantly increased cone production in 25-year-old but not in 40-year-old seed trees.

232.312. Seed Collection, Extraction and Grading (including Seed Weight)

See also No. 227.

216. HARDING, J. H. **The effect of mechanical de-winging on *Pinus pinaster* seed.** *Aust. For.* 16 (1), 1952 (47–52 + 2 photos).

In 1951 nursery sowing, a parcel of Portuguese (Leiria) strain of *Pinus pinaster* seed gave a very low % germination in the Gnangara nursery, but apparently identical seed from the same parcel was satisfactory in the Somerville nursery. The original germination tests in small beds at Collier plantation had also been satisfactory. The reason for the Gnangara failure was found to be machine winnowing; the Somerville and Collier seed had been hand-winnowed to avoid delay in sowing. The triphenyltetrazolium bromide test was found satisfactory on machine-winnowed seed but modification of technique may alter this finding. Machine-winnowed seed was clean, whole, and to all appearances satisfactory, and the basic rason for the radical depression in viability and seedling vigour is not known. The need for caution in machine cleaning of seed is suggested, and details of tests and descriptions of seedlings are given. A general discussion of Western Australian experiences with the Leiria strain of *P. pinaster* seed is given. *From author's summary.*

217. HARDING, J. H. **The effect of mechanical de-winging of *Pinus pinaster* seed. (Completion of the 1951 project.)** *Aust. For.* 16 (2), 1952 (87–94 + 1 photo).

Further trials were made with a new winnowing machine, and comparisons were also made between stratified and unstratified seed. The new winnower, which has a maximum speed of 30 rev./min., gave increased germination when seed was given two runs through it, whereas the origial machine [cf. preceding abstract], with a maximum speed of 60 rev./min. gave much lower germination (both in comparison with hand winnowing). The experiments with stratified and unstratified seed showed that there is inherent dormancy in this species, and that stratification effectively removes it. It was also shown that some interacting agency involving mild vibration and scarification (as in the second type of winnower) stimulated germination, though not as effectively as stratification. It also appears that some chemical change occurs in the seed when subjected to excess vibration.

218. ZACHAR, D. Vliv váhy žalud'ov na rast a vývoj semenáčkov duba letného. **[Effect of the weight of acorns on the growth and development of Pedunculate Oak seedlings.]** *Lesn. Práce* 32 (1), 1953 (17–23). 1 ref. [Slovak.]

Tabulates some results of observations on the relationship between the weight of acorns and germinability, obtained by several Soviet authors, and describes in detail an exploratory test carried out since 1950 in a forest nursery of Bohemia. The results of this test show that, for acorns from the same tree, the height of seedlings (10 months old, since the acorns were sown in December 1950, and the seedlings measured in October 1951) depends on the weight of the acorns; this relationship does not hold if seedlings of different provenance are compared. It was also been found that the height of seedlings from large acorns is more uniform than for medium and small acorns. Survival results show less clear relationships, but small acorns appear to offer a smaller chance of survival.

232.315. Seed Storage and Treatment

See also Nos. 217, 431, 436.

219. BARTON, L. V. **Seed storage and viability.** *Contr. Boyce Thompson Inst.* 17 (2), 1953 (87–103). 22 refs.

Effect of extended storage under various conditions on the viability of a number of seeds, including some tree species [*Abies grandis*, *A. nobilis*, *A. magnifica* var. *shastensis*, *Pinus echinata*, *P. taeda*, *P. palustris* and *P. resinosa*, *Picea abies* and *P. glauca*, and *Ulmus americana*] are reported and data given. Results show the advantage of reduced moisture content and sealed containers; rapid deterioration

at laboratory temperature and in a saturated atmosphere at 5° C.; retention of high germination capacity for ca. 5 years in sealed storage at 5°, and for 10 years or longer at — 4°. The importance of an unbroken seal from the time of storage until the time of germination is emphasized. *From author's summary.*

220. **[Treatment of seed of *Cupressus sempervirens* and *Pinus halepensis* var. *brutia*.]** *Rep. For. Dep. Cyprus 1952*, 1953 (13).

Germination of these species in the field can be obtained within 3 weeks of sowing if the seed is first soaked in water for 2 days and then buried in a manure pit to a depth of 2–2½ ft. for 15 days. Untreated seed takes 6 weeks or more to germinate.

232.318. Seed Testing. Germination Tests. Seed Quality

See also Nos. 216, 245.

221. SIMAK, M., and GUSTAFSSON, Å. **X-ray photography [of forest tree seeds] and sensitivity in forest tree species.** *Hereditas, Lund* 39 (3/4), 1953 (458–68). 8 refs. [E.] [Forest Research Institute, Experimentalfältet, Sweden.] O.R.S.

A fuller account, in English, of the research work already described. [*For. Abstr.* 14 (No. 3294).]

222. ROHMEDER, E. Der unterschiedliche Keimverlauf von Samen der europäischen und japanischen Lärche. **[Differences in the course of germination between seeds of *Larix decidua* and *L. leptolepis*.]** *Forstwiss. Cbl.* 72 (7/8), 1953 (210–20). [G.g.]

Tests of 600 seeds of *L. decidua* and 95 seeds of *L. leptolepis* showed that, up to the end of the 3rd, and often the 4th week, *L. leptolepis* germinates more slowly than *L. decidua*. Germination % in *L. leptolepis* increases between the 28th and 42nd days. This slowness in germination is not only to be observed in imported seed, but also in fresh, native seed. It is not due to differences in the thickness of the coat. Investigations showed that both root growth and respiration rates of the embryo are quicker in *L. decidua*.

232.32. *Plant Rearing. Nursery Practice*

See also No. 277.

232.322. Preparation and Treatment of Soil, including Maintenance of Fertility.

See also Nos. 237, 800–1.

223. **Nutrition problems in forest nurseries.** *Rep. Rothamst. exp. Sta. 1952*, 1953 (42–5).

From past failures with a variety of fungicides in field and pot experiments, it seemed likely that a major difficulty was to secure intimate incorporation of the active material throughout the whole mass of surface soil. It was therefore decided to test a number of volatile fumigants. Chlorpicrin, injected in February in about 2-ml. doses at 9-in. centres gave significantly better results than formalin solutions in each of the 3 nurseries where it was tested and also in pot experiments with the same soils. $C_2H_4Br_2$ failed in the pots and in two of the three nurseries, but it gave marked improvements in Ringwood nursery, which is known to carry a much heavier population of nematodes than the other nurseries. Examination of plants from experiments at Ringwood showed that formalin, chlorpicrin, and $C_2H_4Br_2$ greatly reduced the numbers of the nematode *Hiplolaimus uniformis* on 1 + 0 Sitka Spruce. Formalin solutions applied 2 months before lining out, markedly improved the growth of Sitka transplants in several nurseries. In one nursery, however, where treatment was postponed until a month before lining out, most of the plants died.

An experiment started on very acid soil in Sugar Hill Nursery, Wareham, in 1948, received 8 kinds of seed covers for 4 successive crops of 1 + 0 Sitka. The 5th crop, in 1952, received a uniform SiO_2 cover to measure the residual effects of the earlier treatments. The residues from 4 covers containing considerable amounts of $CaCO_3$ as limestone or shell fragments gave much poorer Sitka growth than covers free from $CaCO_3$. This experiment reproduced a set of conditions which in the past had led to serious losses of productivity in many nurseries. Calcareous seed covers were used frequently before the autumn of 1947, when, on the recommendation of Rothamsted, they were banned in Forestry Commission nurseries.

In an experiment at Wareham, which has run for 4 seasons with 2 years' grass ley followed by 2 successive crops of 1 + 0 Sitka, the first crops of Sitka have been much poorer than the second. Observations in other experiments in this nursery, on a site that had carried ley two years previously, suggest that the grass root residues decompose very slowly and in some way interfere with the normal growth of Sitka seedlings. [Cf. *For. Abstr.* 14 (No. 2171).]

224. ANDO, A., and HUKASAKU, T. **[The effect on the growth of Sugi (*Cryptomeria japonica*) one-year seedlings of increasing application of fertilizers.]** *Bull. Tokyo Univ. For.* No. 44, 1953 (15–22). 20 refs. [Jap.e.]

In a series of experiments at the Tanasi and Koibuti nurseries, each of the elements, N, P or K was applied at 0, 10, or 20 g./sq.m. with a fixed amount (10 g./sq.m.) of the other two. Less seedling growth occurred when one element was lacking, especially N at Tanasi and K at Koibuti; also when 20 g. of one element was applied, decrease in growth being greatest for the higher amount of K and least for that of N. The weight/length ratio of the seedlings increased with higher soil fertility and the top/root ratio with increasing amounts of N. In another series, where N was applied at rates of 0, 5, 10, 20, 40 and 60 g./sq.m., seedling growth increased with increasing N to 20 g. and then decreased. The maximum content of N in the seedlings was found at 40 g., being 1·67% for the whole plant and 1·83% for the shoot. N contents in the root were lower than in the shoot, remaining at a nearly constant level of about 1% with applications over 10 g. Relationships between weight and N content in seedlings suggested that the optimum application was 20 g. Utilization of N was highest for an application of 5 g., with a coefficient of

absorption of 42% as against 15% for 20 g. [Cf. *For. Abstr.* 14 (No. 3303).]

225. **Soil conditioners.** *Rep. Rothamst. exp. Sta. 1952*, 1953 (45).

In 3 small-scale experiments to evaluate a soil conditioner (the Na salt of a hydrolysed polyacrylonitrile, supplied as 'Krilium CRD-189'), it was applied in forest nurseries, at a rate of 3 cwt./acre, (*a*) carefully incorporated into the surface by forking, (*b*) raked into the surface inch after forking, and (*c*), applied in both ways. The soils were fine sands or sandy loams. No visible effects on soil structure or crop growth were observed at any stage, apart from some inferiority of growth following (*b*) in one nursery. The experiments were made with the active material without any diluent or filler, and its hygroscopic nature may have interfered with intimate incorporation. It would appear that improved methods of preparation and application must be devised before synthetic soil conditioners can be expected to improve crop growth under normal agricultural or horticultural conditions.

232.323. Sowing and Covering

See also No. 223.

226. FREE, R. A. **Germination and emergence of Eucalypt seed when sown at depth.** *Aust. For.* 15 (2), 1951 (115–20).

Several species were sown at various depths simulating the conditions of natural seedfall. The most promising young plants were obtained from seedlings that emerged from a soil cover of 0·2–0·3 in. All species could push through half an inch of soil. *E. globulus* emerged from a soil cover of as much as 1·5 in., when germinating in heaps.

232.324. Transplanting and Lining Out, including Grading of Seedlings

227. FOWELLS, H. A. **The effect of seed and stock sizes on survival and early growth of Ponderosa and Jeffrey Pine.** *J. For.* 51 (7), 1953 (504–7). 7 refs.

An experiment was set up in 1938 by the California Forest and Range Experiment Station to determine the relative survival rates and growth of trees from 3 size-classes of seed, of seedlings, and of transplants. The results are described and discussed in detail. In spite of segregation methods that may have minimized competition between size classes, the dominant trees at 11 years mostly came from large or medium-sized transplants or seedlings; but 18–20% of the largest trees in the plantation started as small seedlings or transplants, which suggests a genetic influence. There was no marked difference between the two species in this respect and seed size had no lasting effect on survival and growth of trees.

232.325. Tending (in both Seedbeds and Transplant Beds)

See also No. 237.

228. STRYCKERS, J. La destruction des plantes adventices au moyen de produits chimiques dans les pépinières forestières. **[Chemical control of weeds in forest nurseries.]** *Bull. Soc. for. Belg.* 60 (6), 1953 (301–11). 15 refs. [F.]

A review of current practice in the U.S.A., Great Britain, and Scandinavia. Includes a table of common European weeds, showing their sensitivity to 'White spirits', 'vaporizing oils', and aromatic oils.

229. HARDING, J. H. **Mineral oil as a weedicide in Pine nurseries.** *Aust. For.* 16 (2), 1952 (95–9 + 4 photos). 11 refs.

Kerosene, adjusted to 15 and 20% aromatics, was tried as a weed-killer at Gnangara Pine Nursery in 1951. Results were good with 20% oil. The weeds concerned and general notes on the operations are given.

232.326. Salvage of Overgrown Seedlings and Transplants. Root Pruning etc.

See also No. 237.

230. STĂNESCU, V. Fasciculaţia rădăcinii la quercinee în primul an de vegetaţie in culturile din pepinieră. **[Root branching of Oaks in the first year's growth in the nursery.]** *Rev. Pădurilor* 66 (1), 1951 (10–2). [Rum.rum.russ.]

Gives results of root pruning of *Quercus robur* seedlings to encourage branching of the roots. Pruning of the tap-root was effected as soon as the first shoot appeared above ground, and the seedlings were then planted out in rows and examined in the following April. Tap-roots were pruned to lengths of 1·5, 2, 2·5, 4, and 5 cm. All treatments gave some branching, but the 5-cm. length was the most favourable.

232.327. Protection Measures in Nurseries

See also Nos. 403–4, 460, 503.

231. SMITH, D. N. **Nursery insect investigations.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 9 (3), 1953 (4).

Application of chlordane dust (6 lb. actual chlordane per acre) to fallow in a forest nursery, successfully prevented infestation by the strawberry root weevil (*Brachyrrhinus ovatus*). [Cf. *For. Abstr.* 13 (No. 3786); 15 (No. 493).]

232.328. Vegetative Propagation

See also No. 245.

232. VIEITEZ, E. Estudios sobre la reproducción vegetativa del castaño. I. Enraizamiento en el acodo alto mediante el empleo de fitohormonas. **[Vegetative propagation of *Castanea*. I. Air layering by means of growth substances.]** *An. Edafol. Fisiol. veg.* 12 (4), 1953 (337–73). 8 refs. [Span.span.e.] E.M.B.

The experiments were carried out by the Department of Plant Physiology of the Misión de Galicia, Pontevedra. Growth substances were applied in lanolin paste to living branches of 3- to 4-year-old trees, which were then covered with moist sphagnum moss and wrapped in a plastic material. Substances were tested at various strengths and in different combinations. The best results were given by the following treatments: (1) 10 mg. 3-indolebutyric acid per g. gross substance, (2) 4 mg. β-indoleacetic acid + 4 mg. 2,4-D per g. gross substance, and (3) 5 mg. α-naphthalene-acetic acid + 1 mg. 2,4-D per g. gross substance. Care must be taken in the use of 2,4-D and 2,4,5-T, in order to prevent toxic effects.

The best time for the treatments is the beginning of the growing season.

232.329. Miscellaneous (including Greenhouses, Frames, Raising in Pots, Tubes etc.)

See No. 239.

232.33. *Formation of Stands by Direct Sowing*

See also Nos. 431, 436.

233. KARANDINA, S. N. Razvitie vshodov duba v zavisimosti ot intensivnosti ih vzaimodeĭstvija meždu soboĭ. **[Development of Oak seedlings as related to the intensity of interaction between them.]** *Dokl. Akad. Nauk SSSR* 89 (4), 1953 (733–6 + 1 plate). [Russ.] A.P.B.

In May 1952 direct sowings of Oak were made at Dzhanybek, W. Kazakhstan, to test the effects of density of sowing. The seed was of a single provenance (Volga valley, Stalingrad Province), uniformly treated, and sown 7–8 cm. deep over an area of 1458 sq.m. with uniform soil. The only variable was number of acorns (1–15) per seed-spot; 6 series were tried, with 3 replications each. Spots were spaced 50 cm. apart, with 300 cm. between rows, where 1-year-old seedlings of *Lonicera tatarica* were planted at sowing time. Emergence of the Oak began on 2 June, and periodic counts of the seedlings were made from then until mid-October. The whole area was cultivated 6 times during the growing season. In early September, measurements were made of height, diam. and leaf dimensions of each seedling. Results are tabulated and show that average heights and diameters [at root collar?] decreased respectively from 21 to 14 cm. and from 6 to 3 mm. as the number of acorns/spot increased. The number of shoots appearing above ground was quite unreliable as an index of the number of seedlings, since, in the denser sowings especially, seedlings tended to die back and to coppice—sometimes even before emergence. There was practically no such coppicing in the series with 1 acorn/spot, but coppicing increased with sowing density. The coppice shoots, especially if numerous, were feeble and sometimes died. Leaf dimensions also decreased with increasing density; for the lowest densities the palisade tissue was better and the spongy mesophyll less developed, i.e. the leaves were more xeromorphic and probably more adapted to the droughty environment. Leaves of the denser sowings tended to have a higher moisture content; this, however, owing to their less xeromorphic structure, was more easily lost on hot or windy days. As the year was relatively favourable, most of the seedlings showed more than one period of shoot extension, the number of these varying from ca. 2·5 for the least dense to 1·6 for the densest sowings. Excavation of root systems showed that their development deteriorated as regards both depth and ramification with increasing density of sowing. In the denser sowings, the seedlings at the edge of the spot developed better root systems than those inside it. Dense nest sowings thus appear to be unsuitable, at least for this region.

234. ČAPURIN, F. K. Opyt vyraščivanija lesnyh polos gnezdovym sposobom na Kubani. **[Trials in raising shelterbelts by the nest method in the Kuban [N. Caucasus].]** *Dokl. vsesojuz. Akad. sel.-hoz. Nauk Lenina* 18 (1), 1953 (48–51). [Russ.] A.P.B.

Gives results to September 1952 of direct nest sowings by Lysenko's method in 1949–52, using chiefly Pedunculate Oak for the main storey (but also a few other spp. on which only brief notes are included), Maples for the second storey, and shrubs such as *Caragana arborescens* for the third, with or without agricultural crops as cover in the first three years. Concludes that the method is successful for Oak in this region provided that agricultural cover crops are used on the spaces between rows but the actual Oak nests kept clean-weeded.

235. HATTERSLEY, J. G. **A method of direct seeding in rodent infested areas of summer drought.** *J. For.* 51 (8), 1953 (579).

Describes a method evolved by a forester in Los Angeles County, California. Soil is broken with a hoe, tamped down, and seed sown in a small depression made by a wing-nut on the hoe, and covered thinly with soil. A 4-in. square of newspaper or toilet paper is laid over the seed spot, covered with ¼ to ½ in. of mineral soil, firmed down and gently raked. The whole operation is said to take 30–45 seconds. The paper protects the seed from birds and rodents, reduces evaporation, and does not prevent development of the seedling.

232.4. Formation of Stands by Planting

236. MACKAY, J. H. **Notes on the establishment of Neem plantations in Bornu Province of Nigeria.** *Farm & For.* 11, 1952 (9–14).

A study made during 1950–1 showed that *Melia azadirachta* grows well on deep pure sands and well drained loams, is less successful on silty sands, and fails totally on silty flats and clayey depressions. The land available for plantations is mainly poorer silty sand. Available soil moisture on the silty sands is on average not more than ⅔ that of sands and loams, and the soil becomes hotter and lacks free aeration. Interplanting with farm crops, groundnuts, beans or millet gives markedly better results than planting on unfarmed land. In an attempt to control yellowing, which causes mortality on all but the best sites, trial hoeings were made in plantations in October when rainfall became slight and yellowing of the Neem plants appeared. By December plants in hoed belts were green, while the unhoed were yellow and dying. Hoeing in early September while rainfall was still good almost wholly prevented yellowing. It is suggested that the yellowing may be caused by the thin skin of purplish algae, charactistic of silty sands in Bornu. Rain determines the planting season, and planting should be completed by mid-August. Direct sowing might be successful if the seed were pre-germinated in a watered heap and sown in fair numbers between lines of millet in June or soon after. Notes on later treatment and on plantations of *Dalbergia*, pure or with Neem, at Maiduguri are also given.

232.41. *Planting Stock (Type, Handling and Treatment)*

See also Nos. 206, 227, 239–40, 404.

237. Björkman, E. Om orsakerna till granens tillväxtsvårigheter efter plantering i nordsvensk skogsmark. **[Factors arresting growth of Spruce after planting on forest land in N. Sweden.]** *Norrlands SkogsvFörb. Tidskr.* 1953 (2), (285–316). 32 refs. [Sw.sw.e.]

A series of experiments was begun in 1947 in 6 nurseries, in which plants were given organic or artificial fertilizers and planted out on different forest sites as 2 + 0 or 3 + 0 plants. Detailed results will be published later, but conclusions so far are that plants put out on sites poor in nutrients give better growth if they have received a moderate dose of fertilizer in the nursery, that excessive treatment with fertilizers in the nursery is associated with higher mortality after transplanting, that 2 + 0 grow more strongly than 3 + 0 plants, but that mortality is higher among the former, probably because they are rather small to handle without damage during planting, and that mortality for both 2 + 0 and 3 + 0 plants from the poorer nursery sites is higher than for those from better sites.

In a series of greenhouse experiments 2 + 0, 3 + 0, 1 + 1 and 2 + 1 plants were planted in mineral soil from an old Spruce forest and (1) left untreated, (2) given a fertilizer containing N, P, K and Ca or (3) given enough water to maintain the water level at the height of the soil surface. (1) gave the best and (3) the worst root development. An examination of the roots showed better development, especially as regard short roots, in transplanted than in untransplanted plants and with the latter in 2 + 0 than in 3 + 0 plants.

In a further greenhouse series, plants with roots damaged in 6 different ways and undamaged controls were given a fertilizer or left untreated, and watered at the rate of 1 litre/week or 20 litres/week (the actual amounts being varied slightly with the season, but the ratio of 1 : 20 maintained). All the plants were included in a general examination and mortality count but only 4 or 5 from each group (84 plants) were lifted for root examination. Even plants with the root system severely curtailed developed normally, mortality being lowest among plants treated with fertilizer. The water supply was especially important among plants that had not been given a fertilizer, e.g. the mortality of plants with ¾ of the root system cut away was 92% in the 1-litre and 25% in the 20-litre series without fertilizer and only 8%, irrespective of the rate of watering, with fertilizer. An examination of the roots showed that the most important factor was the number of points at which new roots could develop in the upper part of the root system.

It is concluded that the development of a good root system with mycorrhizae is very important and that sample plants should be examined before planting out, especially on to poor soils. Fertilizer treatment in the nursery should not be heavy enough to prevent mycorrhizal development. Transplants should be used whenever possible.

232.42. *Methods of Planting (including Use of Fertilizers etc.)*

238. Résultats d'essais de fumure avec phosphate Thomas sur épicéas pendant une période de 44 ans, à Sart-lez-Spa dans la Fagne Richehomme. **[The results of manuring trials with basic slag on Spruce during a period of 44 years at Sart-lez-Spa in the Fagne Richehomme.]** Service Agronomique des Producteurs Belges et Luxembourgeois de Phosphate ou Scories Thomas, 47 Cantersteen, Brussels. 1953. pp. 7 + 2 photos. [F.]

Report on an experiment started in 1909 to determine the effect of various fertilizer treatments at the time of planting Spruce on an acid *Calluna*-heath soil. The treatments were: (1) liming at the rate of 2500 kg./ha. after trenching; (2) as (1) but 5000 kg./ha.; (3) controls; (4) basic slag applied in planting holes at a rate of 1500 kg./ha.; (5) Ca phosphate broadcast at a rate of 3500 kg./ha. after trenching; (6) controls; (7) liming at a rate of 6000 kg./ha. after trenching; (8) as (7) but 9000 kg./ha.; (9) basic slag broadcast at a rate of 1500 kg./ha. after trenching; (10) control. Data are given for g.b.h. and vol./ha. (including thinnings) in 1948 for all treatments. Treatment (2) gave best results, closely followed by (4) and (8), with the rest a long way behind. Treatment (4) also gave superior height-growth in the early stages. It is to be noted that the broadcast application of basic slag gave results much inferior to application in planting holes.

239. **The Engel balled planting procedure.** *Equipm. Note, FAO* No. *A.* 1.53, 1953. pp. 3.

Describes, with illustrations, a method of transplanting (1) nursery seedlings, (2) wilding seedlings, into perforated pots made of Beech-wood shavings, and subsequently planting them out in holes made with a drill shaped to make holes exactly fitting the conical pots.

240. **Field planting.** *Tree Plant. Notes* No. 14, 1953. pp. 21.

This issue, devoted to notes on planting methods and stock, includes: Planting machines furnished in New Jersey (*A. N. Lentz*); Safety modification for Lowther planting machine (*G. K. Schaeffer*); Modifying nursery stock to fit modern planting methods (*W. G. Wahlenberg*); Tractor lug for digging tree planting holes (*W. R. Jalosky*); Use of a short-handled planting hoe in the Appalachians (*W. G. Wahlenberg*); Some notes about the planting bar (*E. Bazukis*); Plows to precede a tree planting machine (*P. O. Rudolf*); Agricultural sweeps make scalping easy (*G. Barrington* and *F. B. Trenk*); Performance of tree-planting machines on Pennyrile state forest (*J. P. Rhody*); Survival of machine-planted vs. bar-planted Longleaf seedlings (*R. M. Allen*); Large Longleaf seedlings survive well (*R. M. Allen*); and [Under-]planting hardwoods for stand improvement in North Mississippi (*B. J. Huckenpahler*).

232.43. *Spacing and Arrangement in Plantations*

See also No. 233.

241. Anderson, M. L. **Spaced-group planting.** *Unasylva* 7 (2), 1953 (55–63). 7 refs.

Cf. *For. Abstr.* 13 (No. 2091).

233. *Afforestation*

See also Nos. 42–3, 280

242. ZEHETMAYR, J. W. L. **Experimental plantations in the far north of Scotland.** *Scot. For.* 7 (3), 1953 (71–8). 2 refs.

Traces briefly the forest history of the far north of Scotland and the islands, and describes the progress that has been made in the last 30 years in experimental plantations by the Forestry Commission.

243. CADMAN, W. A. **Forestry and silvicultural developments in North Wales.** *Forestry* 26 (2), 1953 (65–80).

After a brief general account of natural conditions, the 9 main vegetation types available for afforestation since 1921 are described separately. Preparation of the ground and planting methods are discussed, and this is followed by detailed notes on the relative local values of the species used, on the main problems of policy and management, and very briefly on the problems of protection. The paper is illustrated by 2 charts which are correlated. The first chart shows the main vegetation types and their ground conditions, and the second chart the same types and the tree species which experience has found most satisfactory for planting thereon. There is in addition a table giving up-to-date growth data for the principal species used recently in afforestation. *Author's summary.*

244. JAMES, N. D. G. **Afforestation of industrial waste lands.** *Quart. J. For.* 47 (3), 1953 (170–9 + 7 photos). 9 refs.

The whole question of afforesting industrial waste lands is discussed. They are classified under 6 categories, each of which is described, and for each of which the most promising species are suggested. The general treatment of all such areas is also considered under such headings as the selection of species, planting and establishment, after-treatment and protection. *From author's summary.*

245. RASCHENDORFER, I. Stecklingsbewurzelung und Vegetationsrhythmus. Einige Versuche zur Grünverbauung von Rutschflächen. [**The rooting of cuttings and growth rhythm. Attempts at the fixation of landslide areas by planting.**] *Forstwiss. Cbl.* 72 (5/6), 1953 (159–71). 17 refs. [G.]

In order to find species suitable for planting in such areas, a study was made of 11 *Salix* spp., *Alnus incana*, *Hippophaë rhamnoides* and *Myricaria germanica*, in respect of: (1) Shoot and root formation by cuttings throughout the year, (variations by species, climate, and maturity of cutting), and (2) the germinability of different Willow seeds. Results are presented largely in a series of diagrams, and some practical recommendations for raising plants are made.

246. GRÜNIG, P. Die Flyschaufforstung in wirtschaftlicher, naturwissenschaftlicher und waldbaulicher Betrachtung. [**Economic, scientific, and silvicultural considerations on the afforestation of flysch.**] *Schweiz. Z. Forstw.* 104 (6), 1953 (237–52 + 3 photos). 10 refs. [G.g.f.]

The Swiss flysch region contains some of the most destructive torrents in the country. Their control demands the afforestation of at least 40,000 ha. in addition to engineering works. The economic aspect of this project is discussed, as well as the research needed, e.g. on the natural drainage and climate of the area, and on suitable species for planting. [Cf. *For. Abstr.* 14 (No. 300).]

247. SRIVASTAVA, R. L. **Afforestation in the 'Kholas' [eroded land covered with degraded scrub jungle] of Hastinapur (Meerut).** *Indian For.* 79 (6), 1953 (344–50).

An account of measures taken (1) to improve the existing scrub forest and (2) to afforest the eroded areas.

248. LIÉGEOIS, P. Reforestation sur grande échelle au Kivu. [**Large-scale afforestation in Kivu.**] *Bull. agric. Congo belge* 44 (4), 1953 (703–38 + map). [F.flem.]

Describes the need for afforestation in this denuded region, in order to stop erosion and provide fuel and hut poles; gives an account of the plantations (mainly of *Cupressus* spp. and *Eucalyptus* spp.) already established and the silvicultural methods employed, and notes on the silvicultural possibilities of some native species.

249. SANTOS, T. A., and RIMANDO, P. R. **Reforestation in low rainfall areas in the Philippines.** *Docum. FAO Asia-Pacif. For. Comm. 1952* No. 50, 1952. pp. 7. Limited distribution: FAO, Rome.

Includes notes on the principal species planted.

235. *Underplanting, Advance Planting etc. Nurses and Formation of Mixtures. Interplanting of Inferior Growth*

See also No. 7.

250. [**Use of *Sarcocephalus diderrichii* as a nurse to Meliaceous trees.**] *Rep. For. Adm. Nigeria 1951/52*, 1953 (9).

It has been held for many years that it is not possible to make plantations of Mahoganies and other Meliaceous trees in Nigeria, because of a borer that attacks leading shoots and causes the tree to die back and adopt a twisted growth. Experiments have now shown that such plantations are possible, both pure and mixed. Some of the older Mahogany plots are remarkable in their growth, and the trees, after being somewhat crooked in early youth, are straightening out. African Walnut (*Lovoa klaineana*) does particularly well. Opepe (*Sarcocephalus diderrichii*) appears to be an excellent nurse for these trees, and experiments are to be made to determine whether it is better to plant in mixture or underplant some years after the Opepe has got away. The latter might obviate attack by the leading-shoot borer, which seems to require full sunlight and to be unable to flourish under light shade.

251. MILLER, A. D. **Factors affecting the growth and form of young Beech at Gardiner Forest, Wiltshire.** *Forestry* 26 (2), 1953 (111–22).

The record of an intensive study of young Beech (*Fagus sylvatica*) which had been introduced by planting into an area of old Hazel (*Corylus avellana*) in 1946, using different sizes of strips and groups.

One object was to find out which of the environmental factors, e.g. soil, root competition, light intensity, frost, wind, and humidity, were responsible for the very marked differences in growth. The same Beech were also classified according to their form and their tendency to fork. The conclusions reached are enumerated. Among the more important are that, up to this stage at any rate, the depth of soil over the chalk has no effect on growth; root competition and dense Hazel is not injurious; even quite appreciable reductions in light intensities have no ill effect; Hazel hedges provide considerable shelter from wind, which is likely to be of value where water is scarce, and the number of forks is closely related to leading-shoot damage, of which Lammas shoots are an important source. *From author's summary.*

252. Wood, G. H. S. **Forestry operations at Kakamega, Lake Province, Kenya.** *Tech. Note For. Dep. Uganda* No. 4, 1953. pp. 8.

Describes a method of enriching natural forest by group planting after exploitation, with silvicultural notes on the species principally used (*Steganthus welwitschii*, *Fagara macrophylla*, *Chlorophora excelsa*, *Khaya anthotheca*, *Cedrela* sp., *Acrocarpus fraxinifolius* and *Maesopsis eminii*).

253. Tamari, C. **Quick planting of denuded Bamboo forests [i.e. those invading waste land after destruction of closed deciduous forest] for their improvement.** *Memoirs, Faculty of Agriculture, Kagoshima University* 1 (2), 1952 (113–4). 1 ref. [E.]

Bamboo forests (*Pleioblastus simonii* and other species) found on land freed by the destruction of deciduous forest are invaded very slowly by young trees and may revert to tree forest only after 50 years. The normal methods of treatment—burning and cutting the Bamboo for 2–3 years until the rhizomes are weakened and then planting with *Pinus thunbergii*—is expensive and slow, taking about 20 years for the establishment of a complete Pine forest. In October 1949, *Pleioblastus* forest was cut over leaving the rhizomes untouched, 1-year *Acacia mollissima* was planted at the rate of 1/sq.m. and 1·9 kg. of pig manure applied to each plant. The following June after the rainy season *Pleioblastus* shoots were cut and laid round the *Acacia* plants as a mulch; by autumn the *Acacia* was over 2 m. high. By the following autumn it averaged 6 m. high with a crown breadth of 3·5 m. *Pleioblastus* shoots, by then growing with difficulty were cut again and the forest was weeded. No further tending was done. Total cost was 310 yen/30 sq. m.

236. *Care of Regeneration or Plantations in the Initial Stages of Establishment (including Regeneration Surveys)*

254. Mušič, A. Novo orodje za čiščenje gozdnih nasadov in mladja. **[A new tool for weeding in plantations and young growth.]** *Gozd. Vestn.* 11 (3), 1953 (76–8). [Sloven.]

Illustrated description of a tool combining the action of a sickle and pruning saw. A 300-g. steel blade, 15 cm. long, and provided with 2–3 teeth at either end, is attached at an obtuse angle to a 2-m. wooden handle. Practical trials show this tool to be excellent for clearing out *Rubus fruticosus*, *R. idaeus*, *Clematis vitalba*, ferns, etc., since the worker lacerates neither hands nor footwear as is the case when wielding a sickle, is not obliged to work in a bent position, and can weed selectively. As illustration of its efficiency, a skilled sickle-woman weeded an area of 100 sq. m. in 40 min., whereas a semi-skilled worker using the new tool took only 20 min.

255. Rosenstock, H. A. Unkrautbekämpfung auf Kulturflächen: Werkzeuge und Kosten. **[Weed control in young plantations: implements and costs.]** *Forstarchiv* 23 (5/6), 1952 (110–2). [G.]

Emphasizes the high costs of hand weeding, using sickle or scythe. The sickle (used by women) and scythe (by men) are still the usual tools for this job, and of the two, the latter is safer and more efficient (3 times the hourly performance of, and 35% cheaper than sickle work). Gives some details, with a photo, of a 6-h.p. agricultural motor-mower weighing ca. 220 kg., manufactured by the Firma Gutbrod, Plochingen-bei-Stuttgart, which has been used experimentally in several forests. Under favourable conditions, weeding costs were reduced to DM.4·54/1500 linear m., using the mower, compared with DM.16 and 36 respectively for scythe and sickle work. Further experience is, however, necessary before results can be more than provisional.

256. Heinstedt, D. Taxering av naturliga föryngringar. **[Evaluation of natural regeneration.]** *Norrlands SkogsvFörb. Tidskr.* 1953 (2), (317–34). [Sw.]

Discusses an objective method evolved by L. Tirén for determining the plant and height distribution of natural regeneration [cf. *For. Abstr.* 12 (No. 2961)] and gives examples of its use.

257. Ker, J. W. **The relationship between the number of trees [seedlings] per acre and the percentage stocking of reproduction.** *J. For.* 51 (5), 1953 (342–4). 3 refs.

For the forest conditions sampled (cut-over Pine areas in Arkansas), in sparse reproduction the seedlings were randomly distributed, whereas in medium to dense reproduction (over 25% stocking) the seedlings tended to occur in clumps. Using the data collected in this study, a satisfactory relationship between number of seedlings/acre and stocking % based on 40-milliacre quadrats was obtained by transforming numbers of seedlings/acre to logarithms (i.e. by using semi-logarithmic paper). It is suggested that this transformation may in general be expected to apply wherever reproduction tends to occur in clumps.

237. *Amelioration of Forest Sites*

See also Nos. 215, 236.

258. Alten, F., and Doehring, W. Die Düngung in der Forstwirtschaft. **[The use of fertilizers in forestry.]** *Z. Pflanzenernähr. Düng.* 59 (2), 1952 (145–57). 21 refs. [G.] O.R.S.

Discusses nutrient requirements of trees, the effect on nutrient supply of litter removal, and the

use of green manures and fertilizers, with figures from literature showing their effect on tree growth.

259. JENSEN, P. Anvendelse av kunstgødning i skovbruget. **[The use of artificial fertilizers in forestry.]** *Hedeselsk. Tidsskr.* 74 (5), 1953 (79–81). [Dan.] C.G.B.

[Cf. *For. Abstr.* 14 (No. 325).] Further measurements on Norway Spruce confirm the increased growth obtained by treatment with 'Nitrophoska'. Japanese Larch planted with the Spruce appeared not to benefit at all from the fertilizer.

260. VOUK, V. Auksini u šumarstvu. **[Auxins in forestry.]** *Šum. List* 77 (1), 1953 (1–11). 8 refs. [Croat.e.]

The inconsistent and non-scientific use of the word 'auxin' in D. Afanasijev's recent work [*For. Abstr.* 13 (No. 3826); 14 (Nos. 309–10, 2218)] is criticized. Afanasijev's research is shown to have been carried out in such a manner as to furnish no reliable results.

238. *Timber Plantation Crops requiring Special Treatment*

See Nos. 211, 309.

24. TENDING OF STANDS AND TREES

242. *Thinnings*

261. TAYLOR, R. F. **First results of thinning in Alaska.** *Tech. Notes Alaska For. Res. Cent.* No. 3, 1949. pp. 1.

Results of a small-scale thinning experiment in a 30-year-old densely stocked stand of Western Hemlock/Spruce of low site-index showed that after 20 years the number of trees/acre, average d.b.h., b.a./acre, and rate of height growth on thinned and unthinned plots were roughly the same. As the thinnings have no commercial value the results suggest that such stands should be left to thin themselves. Further and more adequate experiments are needed.

262. GODMAN, R. M. **Thinning second-growth Hemlock-Spruce for pulpwood [in S.E. Alaska].** *Tech. Notes Alaska For. Res. Cent.* No. 7, 1951. pp. 1.

Trial thinnings to (1) 120 crop trees/acre and (2) $\frac{2}{3}$ basal area, showed that about 53 cords/acre pulpwood can be thinned from 96-year-old stands of Hemlock/Spruce, i.e. about $\frac{1}{3}$ of the stand on good sites. Felling time averaged 1·69 cords/acre.

263. MOWAT, E. L. **Thinning Ponderosa Pine in the Pacific Northwest: a summary of present information.** *Res. Pap. Pacif. Nthwest. For. Range Exp. Sta.* No. 5, 1953. pp. 24. 22 refs.

Summarizes data from 25 permanent sample plots established from 1927 onwards and generally thinned at from 31 to 53 years by thinnings of different type, by crop-tree release, or even controlled burning. Figures for height, b.a. and d.b.h. on thinned and unthinned plots are given in graphs and tables.

264. KRISHNASWAMY, V. S., and MATHAUDA, G. S. **An investigation into thinning cycles for young Chir (*Pinus longifolia*) at New Forest, Dehra Dun.** *Indian For.* 79 (8), 1953 (422–31 + 4 gphs.). 3 refs.

Trials have been made since 1936 of 4-, 8-, and 12-year cycles, the intensity in all cases being 'D' grade of ordinary thinnings. The 4-year cycle gave maximum diameter growth as well as total volume. The cycle may be increased to 8 years without affecting total volume. The 12-year cycle gave poor results and maximum mortality. None of the treatments affected height growth or length of clear bole.

265. CRUZ, A. C. D'. **Thinning practice in the Andamans—past, present and proposed.** *Indian For.* 79 (8), 1953 (407–14 + 2 gphs.).

Reviews practice, with particular emphasis on the change from crown thinnings to 'élite-tree thinnings' (reserving and freeing final crop species and individuals in both storeys at ca. 30 ft. spacing), which have been found to be best suited to local conditions in second-growth forest.

243. *Opening of the Canopy (Increment Fellings, Overhead Release and Improvement Fellings)*

266. HAWLEY, N. R. **Rapid growth rates of Longleaf-Slash saw timber in the middle coastal plain of Georgia.** *Res. Note Stheast. For. Exp. Sta.* No. 17, 1952. pp. 2.

Gives graphs showing the distribution of measured volumes in 1951 and expected volume in 1956/acre by diameter classes, and tree distribution/acre by diameter classes for 1951 and 1956, after the first improvement felling in young stands.

267. SHIPMAN, R. D. **Poisoning small-diameter hardwoods with the Cornell tool.** *Res. Note Stheast. For. Exp. Sta.* No. 38, 1953. pp. 2.

An exploratory study on 933 trees of 5 hardwood species-groups (Sweetgum, Myrtle, Oaks, Dogwood and Hickories) using Na sulphamate, at the rate of 6 lb./gal. water to treat about 350 trees and applied by the Cornell tool in January 1952, showed that by May 1953 only about 24% still had living crowns. The treatment was least effective on Dogwood and Hickories and most effective on Sweetgum. [Cf. *For. Abstr.* 14 (No. 2236).]

268. MINCKLER, L. S. **Girdling time for hardwoods.** *Sta. Note Cent. St. For. Exp. Sta.* No. 77, 1953. pp. 2.

Data from (axe) girdling of 22 to 55 trees in each of 21 compartments were used to construct the following equations: man hours = 0·008 × sum of diam. in inches or = 1·55 × b.a. in sq. ft. These may give results rather too low if many of the girdled trees are large.

269. ANDERSEN, H. E. **Girdling and poisoning of live culls.** *Tech. Notes Alaska For. Res. Cent.* No. 21, 1953. pp. 2.

A second test confirmed that poisoning was faster than girdling in S.E. Alaska.

245. *Tending of Trees, Pruning etc.*

270. STREHLKE, E. G. Zur Ästung der Fichte: ältere Erfahrungen und neue Untersuchungen aus dem Forstamt Westerhof. **[The pruning of Norway**

Spruce: older experience and new investigations in the Westerhof forest district.] *Forstarchiv* 23 (5/6), 1952 (93–100). 21 refs. [G.]

Deals with the principles, technique and expected financial results of pruning, on the basis of local experience in the district (10 km. W. of the Harz), where the stocking is predominantly Spruce of site-quality classes 1–2, on a 120-year rotation, and where for the past 20 years all stands that have reached 20 years of age have been systematically pruned. The ultimate pruning height aimed at for quality class 1, with due regard to economic utilization and incidence of butt rot, is ca. 12 m. The only safe time for pruning is the dormant season, October-March or preferably November–February inclusive. Experience has led to a systematic schedule of 4 prunings, at the ages of 19 (up to 2·7 m.), 25 (5·0 m.), 34 (8·5 m.) and 46 (12·5 m.). A d.b.h. of 7 cm. is the minimum for the start of pruning. In practice, the schedule implies an average starting d.h.b. of 9 cm. with average diameters at pruning height of respectively 8, 9, 12 and 14 cm. The corresponding numbers/ha. of trees to be pruned are 1000, 800, 600 and 400, the last allowing a generous margin over the expected final crop of 200–250 trees/ha. Selection of the trees can be left in the first 3 prunings to the workers, but the last is marked in advance by a forest officer, care being taken to secure a final spacing as uniform as possible (triangular spacing of ca. 5·4 m.). The first pruning must precede the first thinning, and in all thinnings the first point is to favour the best of the pruned trees. Where there is a risk of bark scaling by deer, the countermeasures taken (without, as yet, sufficient experience for a considered appraisal of their effectiveness) are (*a*) wiring pruned branches round the stems as a mechanical protection, done by pairs of women, at a cost of DM.60/ha; and (*b*) Sinoxyd F [cf. *For. Abstr.* 14 (No. 1334)] applied by rucksack sprayer, at a cost of DM.125/ha.

For the pruning operation itself, hand and pole saws are used. Chisels are unsuitable, as they tend to injure the bark and to leave splinters or irregular stubs. Pole lengths vary from 1·2 for the first to 2·7 m. for the last pruning; Bamboo poles are preferable to Spruce, saving ca. 20% in weight. Pruning can be done from the ground up to 5 m. height, with a single ladder up to 8 m., and with a double, extending ladder from 8 to 12·5 m. This ladder, shown in a photo, has two 5-m. sections (8·5 m. long when fully extended) with Spruce stringers and Ash rungs. The top, middle and bottom rungs (binders) should preferably be of Oak. The ladders stand firmest when placed vertically up against the tree and secured by straps at the top and middle. A board (75 × 25 × 4 cm.) is provided at the top of each section for the pruner to stand on. The two sections, weighing respectively 13 and 11 kg., can be taken apart and used as single ladders. Other equipment comprises a safety belt and cord for the pruner, a cap with neck shield, a celluloid eye-shield, a saw file and knife to clean resin off the saw. Each pruner also carries a block of numbered ungummed paper tickets, stuck on with saliva to each tree as completed, for temporary control purposes.

Notes are included on type of worker (women or men, fit or partially disabled) employable for the 4 stages of pruning, on the sequence of work (which differs in each of the 4 stages), and on standard timings and piece rates for pruning work, with a tabular conspectus of: stand factors; equipment; pruning height; work difficulty; type of worker; times, performances and wages; trees/ha; costs/ha; and expected financial return/ha. For all but the last, the figures are given separately for each of the 4 stages of pruning. The need is also emphasized for the planning of the labour force, and for proper records of pruning carried out.

271. Finnis, J. M. **Experimental pruning of Douglas Fir in British Columbia.** *Res. Note B.C. For. Serv.* No. 24, 1953. pp. 26. 16 refs.

Pruning was carried out to various heights in 20-year-old second-growth stands of Douglas Fir. Measurements over 15 years showed that pruning up to half tree height can be done safely without adverse effect on growth. Pruning up to 14 ft., using a handsaw and ladder, took an average of 7·62 min. (based on 159 trees). One 10-year-old plantation was pruned to 20 ft., pruning being done in 3 ways: (*a*) in three operations—0–7 ft.; 4 years later, 7–13 ft.; and another 4 years later 13–20 ft.; (*b*) in two operations (14 years old)—0–13 ft.; and 4 years later, 13–20 ft.; (*c*) in one operation (18 years old); 0–20 ft. It was found that (*c*) is the cheapest method for costs of supervision and administration as well as of labour. The use of handsaw and ladder proved quicker and more efficient than that of pole-saw, and was preferred by the workers.

272. Derr, H. J., and Mann, W. F. **Cost of pruning Longleaf Pine.** *J. For.* 51 (8), 1953 (579–80).

273. Clark, F. B. **Time required to prune Black Walnut trees.** *Sta. Note Cent. St. For. Exp. Sta.* No. 78, 1953. pp. 2.

Pruning time was recorded for 30 trees in each of the diameter classes 3, 4 and 5 in., in a plantation ca. 17 years old and stocked 500–600/acre; about 1 tree in 4 was pruned. Pruning time increased with d.b.h. and pruned height, the average ranging from about 3 min. for 8 ft. cleared height to nearly 9 min. for 18 ft. The time required to remove the branches from a section of bole of a given length was the same whether the section was high or low on the bole.

274. Bauer, F. Astung und Holzqualität bei der Roteiche. [**Pruning and timber quality in *Quercus borealis*.**] *Holz-Zbl.* 79 (28), 1953 (301). [G.g.]

Pruning and early underplanting are necessary to obtain good-quality wood. *Stereum rugosum* appears sometimes to invade pruning wounds; a preservative coating is recommended.

25. TREATMENT OF DEFECTIVE, DERELICT OR VERY OPEN STANDS

275. Garcia Diaz, E. El pino piñonero en la provincia de Cuenca. [***Pinus pinea* in Cuenca province.**] *Montes, Madrid* 11 (51), 1953 (221–3). [Span.]

Brief notes on the *P. pinea* stands and the reasons for their present degenerated state.

276. MINCKLER, L. S. **Poor Oak sites may grow good Pine.** *Tech. Pap. Cent. St. For. Exp. Sta.* No. 134, 1953. pp. 6. 1 ref.

Mixed stands of *Quercus* spp. and *Carya* sp. on poor sites were treated either by cutting openings 30, 60 and 120 ft. in diameter or by clear felling, and then planting with *Pinus echinata* or *Juniperus virginiana*. The latter did poorly on all sites. Pine survival was good in all plantings, and height growth increased with size of opening, being easily best on the 17-acre clear-felled area.

26. COMBINATIONS OF FORESTRY WITH AGRICULTURE AND PASTORAL HUSBANDRY (INCLUDING SHELTERBELTS AND THEIR TREATMENT)

277. MACALPINE, R. I. **Wood supplies in tea estates.** *Memorandum, Tocklai Experimental Station, Indian Tea Association, Calcutta* No. 24, 1952. pp. 164 + 9 + 19 photos.

Notes on (1) general principles of silviculture for managers of tea estates, with a view to planting waste land in order to provide fuel for workers and timber for packing cases; and (2) nursery practice and silvicultural characters of a number of species suitable for planting in N. Bengal and in Assam.

262. *Fuel and Fodder Forests*

See also Nos. 248, 277, 292.

278. UBHAYAKAR, P. G. **A note on coastal [fuelwood] plantations of *Casuarina equisetifolia* in North Kanara.** *Indian For.* 79 (8), 1953 (446–52).

Notes on silviculture, costs of establishment, revenue and yield.

279. SETTEN, G. G. K. **Yemane (*Gmelina arborea* Roxb.) plantations as a short term firewood proposition.** *Malay. Forester* 16 (3), 1953 (165–9).

Includes volume tables by 1-in. g.b.h. and 0·5-in. d.b.h. classes, and conversion factors for converting stacked to solid volume and vice versa.

264. *Farm Forests*

280. BARTLETT, G. **A Caithness forestry experiment.** *Scot. Agric.* 33 (1), 1953 (33–5). O.R.E.

The Department of Agriculture for Scotland is co-operating with the tenant in an improvement scheme for a hill farm in Watten, Caithness, which includes the establishment of an 80-acre shelter plantation on peatland. Some details are given of site preparation and the planting in 1951 and 1952 of *Pinus contorta* in mixture with other conifers. The *P. contorta* may eventually be removed to leave pure plots of the better species.

281. URQUHART, B. **Small woods.** *Scot. Agric.* 32 (4), 1953 (200–3). O.R.E.

Notes on the usefulness and proper management of farm woodlands, with particular reference to Scotland.

282. WALSH, G. A. **Secure our native trees.** *Forest & Bird, Wellington* No. 107, 1953 (6–7). B.A.P.

Brief information about native New Zealand trees suitable for planting on farms.

265. *Strips or Lines at Road, Rail and Canal Sides, etc.; Hedgerow Trees*

See also No. 1005.

283. HERBIGNAT, A., SEPTROUX, J., and HOUT, A. VAN. Les essences préconisées pour les plantations d'alignement en Belgique. **[Species recommended for roadside planting etc. in Belgium.]** *Bull. Soc. for. Belg.* 60 (7), 1953 (321–56). [F.]

Short notes on silvicultural characters and possible uses of wood.

266. *Shelterbelts, Windbreaks*

See also Nos. 106, 234, 280.

284. KREUTZ, W. Der Windschutz: Windschutzmethodik, Klima und Bodenertrag. **[Protection against wind: methods, climate and crop yields.]** Ardey Verlag, Dortmund. 1952. pp. 167 + 19 plates. 119 refs. [G.] Price *DM.*11 [£1. 0*s.* 0*d.*].

A review of research, mainly European, arranged under the sections: the reasons for protection against wind; fundamental aspects; meteorological conditions in relation to windbreaks; protection by crops and non-living windbreaks; the effect of protection against wind on yields; the technical and legal aspects of shelterbelts; protection against wind and insect damage; summary and conclusions. The different research items are described in detail and fully documented.

285. **Forest influences: effect of wind belts.** *Rep. For. Dep. Ceylon 1952*, 1953 (12).

Attempts were made to determine the effect of shelterbelts of *Eucalyptus* spp. in the region of the dry patana grasslands, on wind velocities during the period when strong dry winds are most prevalent, from May to the end of August. Cycle-type anemometers were placed at a height of 4½ ft. from the ground at varying distances to leeward of the belt. Tentative indications are that there is an average reduction to 25% of the average wind velocity over open ground to a distance to leeward of the belts equal to ca. 10 times the average height of the belts. Wind velocities of 40–50 m.p.h. were common, and strong winds up to 98·2 m.p.h. were recorded during these preliminary investigations.

286. IIZUKA, H., TAMATE, S., TAKAKUWA, T., and SATO, T. **[Experiment on model windbreak (2nd report). Effect on evaporation.]** *Bull. For. Exp. Sta., Meguro, Tokyo* No. 45, 1950 (17–26). [Jap.e.]

The experiment was made on 4 model belts established on a windy shore, of Japanese Black Pine [*P. thunbergii*], 1·5 m. high. The widths of the belts were 4 m., 7 m. and 15 m., and another covering 15 m. but with a 6 m. interspace. Evaporation was observed, using evaporimeters at heights of 0·2, 0·5, 1·0 and 2·0 m., at points to windward and leeward and inside the belts. Evaporation was much lower in the belt than to windward, decreasing from the windward to the leeward side of the belt and was very little more in the open, closely to leeward of the belt, than in the belt itself. To leeward it increased with increasing distance from the belt,

averages for the 4 belts showing evaporation rates 40%, 60% and 80% of open-field evaporation at a distance of h (= tree height), $5h$ and $10h$ respectively from the belts. Their influence persisted up to distances of 20–25h. Within the belts evaporation was at a minimum at ground level, and increased with height, reaching a maximum at mid-stem height, decreasing in the crown and increasing rapidly above the crown. In the open, to leeward, evaporation was least near the surface of the ground, then increased rapidly with height, but more slowly at crown levels. This effect diminished with increasing distance from the belts, disappearing at above 20 h.

The measurements being generally made on cloudy days, the results indicate the effect of the wind alone. From the data obtained, the constants $k = 0{\cdot}29$, $n = 1{\cdot}8/3$ were determined in Trabert's evaporation formula $V = k(1 + 0{\cdot}00376t)\ (F^1{-}f)v^n$ where V = amount of evaporation, t = average temperature, F^1 = maximum vapour tension [vapour pressure?] for t, f = average vapour 'tension' and v = average wind velocity. [Cf. *For. Abstr.* 14 (No. 3852).]

287. DAUTOV, R. K. Vlijanie polezaščitnyh lesnyh polos na moščnostj snegovogo pokrova i na glubinu promerzanija počv. **[Effect of forest shelterbelts on the depth of snow cover and soil freezing.]** *Dokl. Akad. Nauk SSSR* 89 (3), 1953 (555–6). [Russ.] A.P.B.

Presents tabulated results of observations in the winter of 1949–50 on two shelterbelts: a 16-year-old one (5–6 m. high) on a sod-podzol soil, and a 12-year-old one (4–5 m. high) on an ordinary chernozem. By increasing the thickness of the snow cover and reducing the depth of soil freezing, the shelterbelts greatly contributed to the supply of thaw water to the soil in spring. This favourable effect extended to a distance of ca. 100 m., depending on the height of the shelterbelt, with its maximum effect close to the shelterbelt. Other factors being equal, the sod-podzol soil ordinarily freezes to a much greater depth than the chernozem, but the difference between the two becomes negligible near a shelterbelt; the deeper freezing of the former soil is explained by its lack of structure and a denser aggregation.

288. STEUBING, L. Der Einfluss von Heckenanlagen auf den Taufall. **[The effect of hedges on dewfall [with discussion].]** *Berichte des deutschen Wetterdienstes in der US-Zone, Bad Kissingen* No. 32, 1952 (53–6). [G.g.] L.M.O.

Gives figures in graphs and tables showing the increase in dewfall and decrease in evaporation in sheltered areas as compared with open ground. Dewfall reaches its maximum at a distance 2–3 times the height of the hedge.

289. THRAN, P. Ertragssteigerungen durch den Windschutz der Wallhecken (Knicks) in Schleswig-Holstein. **[Increased yields obtained by shelter from wind afforded by hedges on earth-walls in Schleswig-Holstein.]** *Berichte des deutschen Wetterdienstes in der US-Zone, Bad Kissingen* No. 32, 1952 (57–9). [G.g.] L.M.O.

Gives figures showing increased yields of wheat, rye and potatoes in regions with many hedges.

290. CARSTENSEN, H. Windschäden in Schleswig-Holstein und ihre Bekämpfung. **[Wind damage in Schleswig-Holstein and its control.]** *Wasser und Boden, Hamburg* 4 (2), 1952 (29–30). [G.] L.S.

Discusses the local problem, research on the degree of shelter provided by 'Knicks' (hedges on low, earth walls), and a proposed 10-year plan for providing shelter for 10,000 ha./year, starting in districts where the damage is worst.

291. GEORGE, E. J. **Tree and shrub species for the Northern Great Plains.** *Circ. U.S. Dep. Agric.* No. 912, 1953. pp. 46.

268. *Pastured Forests. Grazing on Forest and Open Ranges, Forage Plants etc.*

See also Nos. 30, 102, 378, 380 *et seq.*

292. MOTTA, M. S. **Grasses and fodder resources in the British tropics.** *Emp. J. exp. Agric.* 20 (80), 1952 (283–92). 16 refs. O.R.E.

Reviews some ecological problems of the fodder situation, suitable plants (including woody species) in the 3 major climatic types of agricultural region, discusses some strains and ecotypes within a number of grass species, and comments on the use of fertilizers and the management and utilization of fodder species.

293. SETH, S. K. **Results of trials of grasses under agricultural conditions. Grass yields from two successive croppings in August and October. (To be read in continuation of Leaflet No. 14.)** *Leafl. U.P. For. Dep.* No. 15, 1952, pp. 3. 1 tbl.

Cf. *For. Abstr.* 9 (No. 1180).

294. LAVIN, F. **Guide for reseeding burned and logged-over Ponderosa Pine lands in the Southwest.** *Res. Rep. Sthwest. For. Range Exp. Sta.* No. 10, 1953. pp. 11.

Lists perennial (grass) and annual (*Brassica*) species, showing their value in erosion control, seeding rates and other characteristics, and discusses sowing methods and seasons, and grazing management needed after sowing.

27. ARBORETA. ARBORICULTURE FOR ORNAMENTAL PURPOSES. HEDGES AND HEDGE PLANTS

See also Nos. 103, 288–90, 582.

295. DUNKLEY, H. L., and JOHNSTON, D. R. **Guide to the trees and shrubs in the University Parks, Oxford.** Oxford University Press. 1953. pp. 55 + 4 photos. Price 2*s.* 6*d.*

296. KORENEK, J. Dendrologická záhrada v Kysihýbli. **[The arboretum at Kysihybli.]** *Lesn. Práce* 32 (5), 1953 (214–21). [Slovak.]

This arboretum, established in 1900 near Banska St'avnica in Slovakia, now includes 13 genera (94 spp.) of conifers and 37 genera (92 spp.) of broad-leaved trees. Its total area is 7·7 ha., altitude 524–558 m.

297. HARKNESS, B. **Hortus durobrivensis I.** *Phytologia* 4 (4), 1953 (269–84). 18 refs. A.P.B.

The first part of a catalogue of the living woody plants of the parks of Rochester, New York. The

catalogue will appear in 45 or more parts, and will include brief cultural and historical notes.

298. STEENIS, C. G. G. J. VAN and STEENIS-KRUSEMAN, M. J. VAN. **A brief sketch of the Tjibodas Mountain garden [, Indonesia].** *Repr.* from *Flora Malesiana Bulletin, Kebun Raya Indonesia* [, *Bogor*] No. 10, 1953 (311–51). 18 refs. [E.]

Its history, development and lay-out.

299. ADDISON, G. H., and HENDERSON, M. R. **Notes on the planting of ornamental and shade trees in Malaya, with additional notes on Palms and hedges.** *Malay. Forester* 16 (3), 1953 (131–46 + 12 photos).

28. HUSBANDRY OF FOREST PRODUCTS OTHER THAN WOOD

See also section 892.

283. *Fruit and Seed Crops*

See also No. 1009.

300. El Marañón. **[The Cashew nut tree.]** *Rev. Agric., Costa Rica* 25 (7), 1953 (203, 205). [Span.] A.N.B.

Notes on *Anacardium occidentale*, its products and their processing.

301. SINGH, D. P. **Development of *Artemisia* in Lahaul.** *Punjab For. Notes* 1952. pp. 5.

The wild *Artemisia brevifolia* found growing in the forests of E. Punjab for the most part gives very poor yields of santonin. It is proposed to encourage the cultivation of santonin-yielding varieties (recently determined) in nurseries and also to sow them in the forests.

284. *Crops Tapped for Exudations*

See also Nos. 968–9, 1011.

302. MAZEK-FIALLA, K. Die wissenschaftlichen Grundlagen der Harznutzung und ihre praktischen Auswirkungen. **[The scientific basis of resin-tapping and its practical application.]** *Mater. veg.* 1 (1), 1952 (43–59). 5 refs. [G.g.e.] E.M.B.

A summary of the author's researches in resin-tapping techniques. [Cf. *For. Abstr.* 8 (No. 2657); 12 (No. 3299); 13 (No. 1236); 14 (No. 2264).]

303. PEJOSKI, B. Osvrt na industrisko smolarenje u našoj zemlji. **[Survey of resin-tapping in Jugoslavia.]** *Šum. List* 77 (3), 1953 (136–45). [Croat. croat.f.]

Resin-tapping is done in Jugoslavia by the original or modified French and German methods. The main species tapped are: *Pinus nigra, P. sylvestris, P. halepensis*, and *P. heldreichii*. The total production of resin was 1972 tons in 1952, from which 1400 tons of rosin and 340 tons of turpentine oil were obtained. This production covers only ca. $\frac{2}{3}$ of the national consumption. [Cf. *For. Abstr.* 14 (No. 2907).]

304. WISŁAWSKI, M. Prace Zakładu Pozyskania i Badania Żywicy. **[Report of the activities of the Section of Resin Tapping and Resin Research [of the Polish Forest Research Institute].]** *Sylwan* 97 (2), 1953 (139–44). [Pol.]

Field investigations on the economic aspects of tapping Pine stands of poor quality were conducted for 3 years; the results are now being analysed. A method of tapping Spruce has been developed and research on Spruce resin and on the tapping of Larch is in progress. Research for a period of 6 years on the optimum duration of seasonal tapping and on the effect of different cycles, is now being summarized. Other research on tapping technique (chemical stimulants, optimum season for face-cutting, tools, work safety, etc.) continues. Work on qualitative standardization of resin, turpentine oil, and rosin has been completed. The Section was established in 1945.

305. LARSON, P. R. **Early season streaks unprofitable.** *Naval Stores Rev.* 63 (19), 1953 (20–1).

Graphs show the average yield, and profit or loss, for each of 16 bi-weekly bark-chipped, acid-treated freshenings on Slash Pine yielding at the rate of 200 and 300 barrels per crop. The data, based on 9 different studies over a 5-year period, show that losses and low profits are caused by low yields from the early- and late-season freshenings.

306. **Experimental turpentining of plantation grown *Pinus caribaea*.** *Aust. Timb. J.* 19 (4), 1953 (288 . . . 293).

Experiments were made for 5 seasons on a stand of 20-year-old trees, average d.b.h. 9 in., in particular on yields from French, American and New American faces. The French face gave considerably smaller yields than the other two, which had similar yields. Stimulation with H_2SO_4 gave increased yields for the first year and higher average yields over a 4-year period, but the effect was very much less after the first year. Total yield was greater from two faces on the same tree than from one, but yield per face was less. Although varying with average daily temperature, yields were no larger from faces on the N. than on the S. side of the tree. Tapping was found to reduce growth rates, especially when the more intensive treatments (acid stimulation, 2 faces/tree) were used. Growth rate may be reduced by more than $\frac{1}{3}$. Yields were lower than those obtained from similar treatments in other countries, but are encouraging. Yield per face must, however, be increased or the work reduced, for tapping to be profitable.

307. DAVID, R. L'influence exercée par l'activation du gemmage du pin maritime sur la structure du noyau des cellules du tronc de l'arbre. **[The effect of chemical stimulation in resin tapping of *Pinus pinaster* on the structure of the nucleus of cells in the trunk.]** *C.R. Acad. Sci., Paris* 236 (24), 1953 (2335–7). 2 refs. [F.] O.R.S.

An examination of wood taken from streaks between 15 days and over a year old, showed that treatment with 60% H_2SO_4 caused changes in cell nuclei (illustrated by drawings) to a maximum depth of 15 mm. and to a distance of about 4 cm. above

the most recent acid treatment. [Cf. *For. Abstr.* 14 (No. 2262).]

308. SCHOPMEYER, C. S. **The characteristics of a high-gum-yielding tree.** *Naval Stores Rev.* 63 (12), 1953 (12–3).

Investigations at the Lake City Research Centre, Florida, show that the following factors influence resin yield: (1) the size of the radial resin ducts exposed by freshening, (2) the number of resin ducts per sq. in. of area exposed, (3) the viscosity of the resin, and, possibly (4) the pressure within the tree which causes the resin to flow. A more precise technique is required to measure exudation pressure before (4) can be proved. No tree was rated high for all 4 factors, but high-yielding trees usually had a high score for 1 or 2 factors. If these characteristics are hereditary, selective breeding of high-yielding trees should be possible.

286. *Osier-Growing*

309. MULLINS, D. **Willows—a valuable genus.** *World Crops* 5 (4), 1953 (143–5). O.R.E.

Methods of establishing plantations, the processing and uses of Willow rods, control of pests and diseases; also notes on growing Cricket Bat Willow (*Salix alba* var. *caerulea*).

287. *Bamboo and Cane Growing etc.*

See No. 1009.

3. WORK SCIENCE (WORK STUDIES). HARVESTING OF WOOD: LOGGING AND TRANSPORT. FOREST ENGINEERING

30. WORK SCIENCE (WORK STUDIES): GENERAL

302. *Man and Work* (*Physiology and Psychology*)

310. GLÄSER, H. Einschlagarbeit am Steilhang: Studien zum Energieverbrauch insbesondere beim Steigen und Gehen am Hang. **[Logging work on steep slopes: studies of energy consumption especially in climbing and walking on slopes.]** *Forstarchiv* 23 (5/6), 1952 (112–21). 7 refs. [G.g.]

Gives an account of studies made in Württemberg in November 1951 on the energy consumption, as indicated by 82 respiration measurements, of 4 forest workers engaged in: (1) dragging a 5-m., 0·29-cu.m. Beech log with pickaroons ('*Sappi*') along flat ground; (2) walking, unloaded or with 7 kg. of tools (*a*) along a forest road on the flat, (*b*) in a horizontal direction along a slope, (*c*) uphill and (*d*) downhill. The slope had a gradient of 90%. It is concluded that all movement on a slope demands a high energy consumption, (2*c*) falling among the heaviest kinds of bodily work. Energy consumption in walking depends on speed, but also, and especially, on body weight; on the mountains, small, light workers have the advantage over large, heavy men. A summary table is presented of the average energy consumption in kcal./min., for men with a body weight of 70 kg. and for various walking speeds (10–60 m./min.), engaged in the above tasks, together with some figures from literature for felling and barking.

305. *Sequence of Work and Performance* (*Time and Performance Tables, Evaluation of Work*)

See Nos. 268–9, 270–1, 273, 338–9.

306. *Conditions affecting Work* (*Climate, Site, Stand etc.*)

311. STAAF, A. En undersökning av sambandet mellan arbetsåtgång och behandlingsareal vid skogsvårdsåtgärder. **[An investigation on the relationship between expenditure of work and size of working area in silvicultural measures.]** *Norrlands SkogsvFörb. Tidskr.* 1953 (2), (242–56). [Sw.sw.]

Gives results, based on 251 working sites of different sizes covering a total area of 3904 ha., showing the decrease in time/ha. with increasing area of the site up to 40 ha., for burning over and clearing the felling site, sowing, planting, cleaning and thinning, and for different combinations of these operations. The decrease in time is particularly marked for sowing and planting. The average decrease in working time for the most usual combinations of operations, from clearing the felling site to cleaning, is 1·5% for each ha. of the working site from 0 to 20 ha., and 0·5% from 20 to 40 ha., with corresponding decreases in cost. It is emphasized that the detailed results are purely local in their application although the trends are of general interest.

307. *Tools, Equipment, Machines and Working Animals: General*

See also Nos. 213, 240, 254–5, 270–1, 372–5, 1023.

312. **Equipment news.** *Unasylva* 7 (2), 1953 (84–6).

Descriptive notes, with photographs, of the following among others: portable fire pump (McCulloch Motors Corp., 6121 West Country Blvd., Los Angeles 45, U.S.A.); portable brush grinder (Model No. 3) for grinding branches, tree trimmings and brush into small wood chips (Mitts and Merrill Inc., Saginaw, Mich., U.S.A.); Mandator Mark III tractor with trailer or semi-trailer for hauling tree-length logs (A. C. V. Sales Ltd., 49 Berkeley Square, London W.A.); Model MK26 truck and trailer (Maschinenfabrik, Augsburg-Nürnberg A.G. (M.A.N.), Katzwangerstrasse 100, Nürnberg 24, Germany); heavy-duty logging truck (Hayes Mnfg. Co. Ltd., 225 West Second Avenue, Vancouver, Canada); Radyne (Model H25/W), Radio-frequency glue-setting equipment (Radio Heaters Ltd., Wokingham, Berks., England); crosscut saw 16 in. (41 cm.) Type H.C.S. designed for sustained production work (W. Kellam & Co., Bath Street Works, Belgrave, Leicester, England).

31. LOGGING AND TRANSPORT: GENERAL

313. CHAMBINAUD, M. L'exploitation forestière en Afrique noire. **[Forest exploitation in equatorial Africa.]** *Rev. int. Prod. colon.* 28 (287/288), 1953 (151–5). [F.]

Notes on the methods of felling, skidding and transport, making of forest roads etc.

314. EGERTON, J. O. **Notes on logging in the Philippines.** *Malay. Forester* 16 (3), 1953 (146–56 + 8 photos).

32. FELLING AND RELATED OPERATIONS

322. *Felling Season. Preparatory Measures*

315. KILPINEN, L. Havaintoja rasikoivun kuivumisesta. **[The seasoning of Birch felled and**

left untrimmed.] *Metsät. Aikak.* 1953 (5), (156). [Fi.e.]

In recent experiments it was found that veneer Birch for floating should be felled in late August or early September. If felled earlier it tends to become discoloured and if felled in late September or early October it might not season enough. The optimum felling season depends on the weather. *From authors' summary.*

316. Cook, D. B., and Hamilton, L. S. **Chemi-peeling pulpwood in New York.** *J. For.* 51 (8), 1953 (566–9). 8 refs.

Reviews present practice and some of the literature on the chemical treatment of trees to facilitate barking, with notes on the treatability of the principal New York pulpwood species.

317. Jahn, E. C. **Chemical debarking of trees.** *Sth. Lumberm.* 187 (2336), 1953 (41–2).

Summarizes a study sponsored by a group of companies and carried out by a research team at the New York State College of Forestry, Syracuse University. Studies so far indicate that 40% Na arsenite solution is the most effective chemical. A peelability gauge developed by the team measures the force required to turn a disc of bark of a given diameter on the tree. Recommendations are made on method of application, and date and weather for treatment. Spruce, Balsam Fir, Hemlock, Scots Pine, Beech, Elm, Hard Maple, Red Oak, Cherry and Aspen reacted especially well to chemical treatment, as do, apparently, dominant and co-dominant trees and those of good growth vigour. Diameters between 8 and 17 in. gave good results, trees above and below these limits tending to peel less well. The period of good penetration of the chemical into the tree coincides with that of best natural peeling, middle to late May to June. A large part of the chemical reaches and remains in the bark and leaves. If the girdle is unscored or uncut there is very little depth of penetration, almost all the chemical remaining in the outer part of the wood and bark. If the sapwood is scored or cut there is greater penetration. The movement of As away from the girdle face, studied by radio-active isotopes, was very rapid from unscored girdle faces, 95% being gone in 48 hours with Spruce, and more gradual if the sapwood has been cut or scored. Any danger to wild life occurs in the first 72 hours. Brightly coloured dyes should be avoided, and precautions taken against spilling. Preliminary evidence indicates that creosote and Permatox B may repel deer, other repellents being ineffective. Best results in barking are obtained if treated trees are allowed to stand through the winter. Pulps from treated wood are equal in quality to those from untreated wood and the As content in pulps and papers is from 0 to 2 p.p.m., rates which have been found in some pulps from untreated wood.

318. Craig, J. B. **Science on the stump.** *Amer. Forests* 59 (7), 1953 (8–9, 32–36).

The chemical barking research project set up in Maine by a number of pulp and paper companies has been investigating the possible dangers to wild life inherent in the use of Na_2HAsO_3 to poison trees for the facilitation of barking. After 2 years' work in Huntington forest there was no evidence that animals were attracted to treated trees, nor any evidence of mortality from Na_2HAsO_3. In one experiment porcupines were confined in cages where treated and untreated branches were provided for food. Without exception, they ate the untreated branches and did not take the treated ones until on the verge of starvation. In 1952, however, some 10 animals were found dead near areas where chemical barking had been taking place and examination of their tissues revealed the presence of As. It is believed that in this case the animals had been attracted by the red dye used in the solution (tests with deer showed them to be attracted to food on red boards in preference to blue), and blue dye is now being used instead. The only part of a treated tree that is dangerous is the area immediately round the point of application. The chemical is concentrated at the time of application but as it moves through the tree it becomes so dilute that it is not dangerous in bark, buds, leaves, or twigs. Insects collected on treated areas were found not dangerous to birds that ate them, nor is there any evidence that fish in streams where treated pulpwood has been floated are affected. Studies with radioactive Na_2HAsO_3 indicate that the danger period is short; in less than a week the amount of As at the place of application is so low as to be no longer dangerous.

319. **Determination of arsenic in wood and foliage.** *Rep. For. Prod. Res. Bd., Lond. 1952*, 1953 (46–7).

Results of analyses, after the removal of the organic matter by digesting the samples with an H_2SO_4/H_2O_2 mixture, showed very little As present in needles and wood of Sitka Spruce subjected to 2 different treatments with As applied to standing trees to facilitate bark removal. It had been thought that As accumulated in needles and twigs might in the form of litter have a toxic effect on young roots of surrounding trees, and that the presence of As in the wood might constitute a hazard in handling the wood and might also reduce insect damage.

320. Panshin, A. J., Raphael, H. J., and Day, M. W. **Further observations on 'chemical' bark peeling of Aspen.** *Repr.* from *Quart. Bull. Mich. agric. Exp. Sta.* 35 (4), 1953 (474–81).

Field observations in 1952 of trees treated in 1951 [cf. *For. Abstr.* 13 (No. 3964)] and further experiments made in 1952, lead to the following conclusions. Stem spraying with 2,4,5-T ester in 1951 had resulted in 97·5% kill of Aspen 12 months later, and the bark on dead trees was quite loose. Na monochloroacetate was more effective when applied to frills than when sprayed on peeled girdles; it acts quicker than 2,4-D or 2,4,5-T and in about 2 months after treatment the bark begins to peel in long vertical strips. The 2,4,5-T ester acts more slowly than Na monochloroacetate but faster than 2,4-D ester, but a mixture of 50% each of 2,4-D and 2,4,5-T esters (8 lb. acid equivalent/100 gal. solution) in diesel oil appears to be as effective as 100% 2,4,5-T diluted to the same concentration. Definite loosening of bark to a height of at least 7 ft. above the frill

was evident in the case of Na monochloroacetate 71 days after the treatment, and 3 months after stem spraying with 2,4,5-T. Wood showed little or no discoloration 3 months after treatment.

321. Novák, V. Výzkum rychlého chemického odkorňováni dreva. **[Experiment on rapid chemical barking of wood.]** *Lesn. Práce* 32 (4), 1953 (155–9). [Cz.]

The developmentof barkbeetles and wood-borers on stems treated chemically in order to accelerate barking is described in some detail. Out of a total number of 52 Spruce stems of felling age, 10 were treated once only with an As [+ NaOH?] compound, this [solution?] being rubbed into the wood exposed by girdling; 24 had double treatment; 11 had the same compound injected, while the remainder were untreated controls, some of them girdled. Preliminary laboratory tests showed that the compound, used as stomach poison at 0·08–1·30 mg./c.c. concentration, effected a 50–80% kill of barkbeetles during the first week and a 100% kill during the second. As a contact poison (37·8% As) it killed them in 15–30 min.

The stems were treated in mid-May. It was found that, where the substance had been distributed uniformly, an abnormal or reduced development of the insect occurred in the cambium, the abnormality showing in the dimensions of the mother tunnels, the direction of the larval tunnels, appearance of the frass etc. The injection treatment did not yield good results because the distribution of the chemical was not uniform. Single treatment by rubbing killed 10% of barkbeetles and larvae in the trees after 1 month, and 100% of *Ips typographus* in all stages after 4 months [the % kills are based on total population in the trees of the insect specified]; yet *Pityogenes chalcographus* showed only a 25% kill after 5 months. Stems treated twice gave, after 2 months, an 80% kill of *Ips typographus* larvae, and a 50% kill of all stages of *P. chalcographus* (80% a week later); after 4 months all stages of both species showed a 100% kill. The kill of *Polygraphus polygraphus*, whose tunnels are remote from the poisoned cambium, was only 20% after 4 months, and 50% after 5 months. All the above results relate to stems that were attacked after the treatment. When the attack preceded the treatment, the efficacy of the poison was much reduced, since it could not penetrate well into the tunnels. It is noteworthy that the natural enemies (predators and parasites) of the beetles were not poisoned by the chemical used; and that the attacking insects avoided the sections of wood coated with the poison.

323. *Felling and Subsequent Primary Conversion*

See Nos. 322–9.

326. *Sequence of Operations (including Traditional Order of Operations, Primary Conversion after Extraction etc.)*

322. Makkonen, O. Paperipuurankojen hankinta. **[Logging of pulpwood bolts.]** *Tied., Metsäteho, Helsinki* No. 88, 1953. pp. 3. [Fi.e.] *Repr.* from *Suomen Puutalous, Helsinki* 1953 (3).

In a small experimental investigation, bolts of Spruce were cross-cut in the forest into lengths of 2, 4, or 6 m.; these bolts were again cross-cut at the truck road into 2-m. pieces by a 4-man team using a table circular saw, and were then partly barked, by hand, and piled. This bolt-skidding (*a*) was compared with (*b*) skidding 2-m. partly barked pulpwood, finished in the forest, to the same truck road, a distance of about 2 km. in both operations. In relation to the time taken up to and including piling at the truck road, (*a*) was 9% less advantageous than (*b*) and an analysis of cost would show it to be even less profitable. The use of a balance circular saw, or a chain saw and mechanical barking, might alter the relationship between the two methods.

35. Performance Measurements for Determining Piece Rates in Felling and Related Operations

323. Hilf, H. H. Die Arbeitsleistung im Hauungsbetrieb: eine Übersicht (zugleich Rückblick und Sammelreferat) über Probleme der Leistungsermittlung und Leistungsentlohnung. **[Work performance in logging operations: an outline, retrospect and review of problems in the evaluation of performance and determination of piece rates.]** *Forstarchiv* 23 (5/6), 1952 (81–93). 114 refs. [G.]

324. Minami, F. **[On the production rate and intensive utilization of Ezomatsu [*Picea jezoensis*] and Todomatsu [*Abies mayriana*] for pulpwood in winter logging operations.]** *J. Jap. For. Soc.* 34 (8), 1952 (256–61). [Jap.e.]

Equations are presented for log production (felling, trimming and cross-cutting 12-ft. logs by hand) per working hour and per day, from the results of time studies on the various sizes of tree and the different operations; also an equation

$$G\left(\frac{1}{R}-\frac{1}{R^1}\right)\leq E\left(\frac{L}{L^1}-1\right)=x\left(\frac{1}{L^1}-\frac{1}{L}\right),$$

linking total unit cost G and utilization % R and R^1 (for average and intensive logging respectively) with direct production cost per unit, E, and daily output per man L and L^1 (for average and intensive logging) and with daily wage per man (x) and L, L^1.

325. Campbell, R. A. **Timber cutting and skidding costs in the southern Appalachians.** *Sth. Lumberm.* 185 (2321), 1952 (189–91). 2 refs.

Results of analyses of time studies are given in graphs and tables showing (1) for felling and cross-cutting, the relation of man-hours and costs (including equipment and maintenance) to crew size (using hand or machine tools), species group (hard hardwoods, and Yellow Pine and soft hardwoods) and tree size; and (2) for hauling, their relation to distance, size of load and skidding method. Tree size was found to be the chief factor in felling costs; soft hardwoods and Yellow Pine cost less to fell than

hard hardwoods using hand methods, but power tools greatly reduced the difference; 2-man crews were more efficient than 3-man crews using hand tools, but there was little difference in efficiency with size of crew for power tools; cost of felling with power tools should be only half that with hand tools for the same size of tree. Skidding time/1000 bd. ft. is determined chiefly by distance, the load size and slope being secondary factors. Capacity loads should always be carried. Horse teams should not be used for distances of more than 500 ft. on 40% slopes when tractors are available, and the maximum economical skidding distance for a team decreases with decreasing slope. On slopes of over 50% horse teams are the only mobile skidding units that can be used. Fixed skidding equipment, cableways etc., were not included in the study.

36. TOOLS, MACHINES AND EQUIPMENT FOR FELLING AND RELATED OPERATIONS

See also Nos. 312, 369–70, 372, 1023.

326. **The 'Mira' barker: a new Swedish portable machine.** *Pulp Paper Mag. Can.* 54 (9), 1953 (152, 156).

Describes with illustrations the new barker, made by C. J. Wennbergs Mekaniska Verkstad, Karlsberg, and Paper Mill Equipment Limited, Montreal. The standard machine barks logs from 2 to 12 in. diam., and a machine for barking logs up to 20 in. diam. has been designed. Barking is done by 3 scrapers mounted on a drum which rotates at a constant speed of 275 revs./min. Pressure of the barking tools against the log is applied through spring-loaded counterweights. The bark is thrown out by fanblades on the barking tool. Feeding, by 8 feeding rolls, is at a rate which can vary from 30 to 100 ft./min. Trials have shown that cutting into the wood is prevented and wood loss is negligible. The machine has been used satisfactorily for Fir, Spruce, Birch, Poplar, Larch and even for water-logged timber, and with excellent results on winter-felled timber and autumn-felled timber stored in the open.

327. BELL, G. E. **Developments in mechanical barking.** *Repr.* from *Canada Lumberman, Toronto* June, 1953. pp. [4]. 2 refs.

Describes, with illustrations and addresses of manufacturers in the country of origin and N. American suppliers, the following barkers, mainly Swedish and Finnish: Soderhamn, Skoglund, Mira [cf. preceding abstract], Sund, Valo, Carpenter, Wi-Mar, Jatka disc, Parkko disc, K.M.W., Palmia and Wood Cleaner. [Cf. *For. Abstr.* 14 (No. 2284).]

328. USPENSKIĬ, V. A. **Hardwood sawing with electric saws.** *Transl. Commonw. sci. industr. Res. Organ. Aust.* No. 1790, 1952. pp. 9 + 3 photos + 2 dgms. + 1 gph. P.R. Transl. by M. Slade from *Lesn. Prom.* 11 (9), 1951 (10–3). Limited distribution. [See *For. Abstr.* 14 (No. 2282).]

329. REISSINGER, G. Der Leichtmetallkeil. **[The light metal wedge.]** *Forstarchiv* 23 (5/6), 1952 (107–8). [G.g.]

Describes, with photographs, a wedge of the author's design, made by the Dürener Metallwerke, Düren/Rheinland, and consisting of: (*a*) a pressed duralumin wedge-piece—angle 11·5°, length 190 mm., breadths at 5 and 15 mm. from the working edge respectively 58 and 70 mm., edge thickness 0·5 mm., weight 525 g.; socketed to receive (*b*) a wooden, metal-bound striking heel weighing 545 g. For safety when working on frozen wood the wedge piece has 3 small perforations near the working edge: if ends of wire are inserted into these, they will anchor in the frozen wood and prevent the wedge from jumping back. As the wires are free to pivot at their insertion in the wedge, they are no hindrance if the wedge has to be freed by rocking it from side to side. There is little risk of damage to saws, as the duralumin is much softer than the saw teeth. The wedge is said to have withstood severe conditions of use completely satisfactorily, and to have a long working life.

37. TRANSPORT

330. HAFNER, F. Holzbringung in Österreich: die Erschliessung unzugänglicher Waldgebiete. **[Timber extraction and transport in Austria: the opening up of inaccessible forest regions.]** *Forstarchiv* 23 (5/6), 1952 (101–6). 25 refs. [G.g.]

A review of post-war developments in cable and other skidding methods and longer-distance transport and roadbuilding equipment. [Cf. *For. Abstr.* 14 (No. 378).]

372/377. *Land Transport*

See also Nos. 312–4, 322, 325.

331. SHAW, R. G. **Use of chutes for extraction of thinnings.** *For. Rec. For. Comm., Lond.* No. 20, 1953. pp. 5.

Describes the erection and gives operating costs, of the 3 types of chute used for extraction in British forests in recent years: (1) wooden chutes built up from poles forming part of the crop being thinned; (2) chutes made from galvanized iron sheets, (3) chutes made from sheet aluminium. The figures suggest that overhead charges per unit of output are rather lower for (2) than for (3), and that (1), in spite of the apparent attraction of no capital cost, is in fact the most costly to use, owing to its high cost of erection. Based on 1350 cu. ft., overhead charges per cu. ft. extracted for the three types are (1) 3·4*d.*, (2) 2·0*d.*, and (3) 2·6*d.*

332. KATO, S., and MARUYAMA, M. **[Theoretical analysis of the vibration method of determining maximum tension of a skyline cable.]** *Bull. Tokyo Univ. For.* No. 44, 1953 (67–81). 5 refs. [Jap.e.]

333. BINDER, R. Spôsoby približovania a dopravy dreva v horských oblastiach. **[Methods of**

timber skidding and transport in hilly areas.] *Lesn. Práce* 32 (1), 1953 (34–42). [Slovak.]

Discusses the use of lorries, tractors, and winch- or tractor-operated cableways in the hilly areas of Slovakia. In order to save both time and money, transport from the felling site should be effected, where possible, by lorry. For very steep slopes cableways are best. The Wyssen cableway is capable of improvement: (1) the logs should be attached at both ends to the carriage, thus making it possible to transport long logs and to lower the height of the cableway supports, and (2) a power (winch) drive should be substituted for purely gravitational haulage. On the whole, however, it has proved more economical to transport logs from the felling site to the forest dump on caterpillar tractors than to use a tractor/cableway combination.

334. Eklund, R. Puutavaran autokuljetuksen tekniikkaa. [**Technical development of timber transport by lorry.**] *Tied., Metsäteho, Helsinki* No. 87, 1953. pp. 29 + 7 photos + 4 dgms. + 1 gph. 6 refs. [Fi.e.]

Discusses technical developments in Canada and the U.S.A. and limitations imposed by the Finnish road and bridge system on lorry, trailer and load weights.

335. Steinlin, H. Zur Wahl von geeigneten Rückmaschinen in unserer Forstwirtschaft. [**The choice of suitable extraction machines for Swiss forestry.**] *Schweiz. Z. Forstw.* 104 (7/8), 1953 (330–45). [G.f.]

Seeks to establish the essential points to be considered when choosing a motor vehicle for extracting timber, and demonstrates the uselessness of simple demonstrations for judging its economic value. Results are given of comparative tests, made by the Swiss Federal Forest Research Institute, on the Vevey 560 diesel tractor with built-in winch, and the Unimog, a lorry with tractor and winch, which can be used for both skidding and hauling, developed by the Institute itself. Suggestions are made for improving the winches used with skidding tractors.

336. Heuell. Ein verbesserter Holzrückwagen. [**An improved log-wagon.**] *Holz-Zbl.* 76 (137), 1950 (1533). [G.]

Illustrated description of a log-wagon embodying, *inter alia*, a 3-ton rack-and-pinion winch, double-wheel brakes and a newly designed front carriage equipped with a pincer-type grab.

337. Burckardt. Fahrbare Trage. [**Wheeled stretcher.**] *Forst u. Holz* 8 (16), 1953 (238). [G.]

A stretcher-like wheel-barrow is described, which has one wheel under the centre of gravity. It may be used with or without a wooden box fitment, and is useful in the forest for transporting small logs, plants, game etc. Prices are: small size (2 × 0·6 m.) DM.65; large size (26 × 0·65 m.) DM. 106; wooden boxes DM.20.

338. Putkisto, K. Tukkien kuormaamisesta miesvoimin rautatievaunuun. [**Loading logs on to railway wagons by hand.**] *Tied., Metsäteho, Helsinki* No. 90, [1953?]. pp. 24. 3 refs. [Fi.e.]

Results of preliminary time studies on manual loading are given in tables and graphs [with English captions] showing the time taken for the different operations; the dependence of log-rolling time on distance; average lifting time for logs of different sizes; dependence of rope-hauling time on the size of log and height of lift; effect of log size on time spent in arranging the logs, average wagon time (i.e. times independent of size, number, rolling and hauling distance, and height of lift of the logs); and the effect of size of log, height of lift, distance of haul and rolling distance on loading-place time. *From author's summary.*

339. Putkisto, K. Tukkien rautatiekuljetuksen mahdollisuudet paranevat. [**Rail transport facilities of logs improving.**] *Tied., Metsäteho, Helsinki* No. 91, 1953. pp. 6. [Fi.e.]

Discusses, with photographs, some equipment for mechanical loading of logs on to railway wagons. The average time per wagon for manual loading was about 540 man-minutes, for loading with a hoist 180 man-minutes, and for loading with a winch 240 man-minutes. *From author's summary.*

340. Fujibayas[h]i, M., and Kato, S. [**The [starting and running] resistance of forest-railway trolleys used in the Tokyo University Forests at Chichibu and in Hokkaido.**] *Bull. Tokyo Univ. For.* No. 44, 1953 (41–65 + 1 tbl., 8 photos). 11 refs. [Jap.e.]

Cf. *For. Abstr.* 14 (No. 1261).

378. *Water Transport*

341. Pöntynen, V. Puutavaran uittomääristä vuosina 1923 [*sic*]-52 sekä ennakkotietoja v:n 1953 uitoista. [**Timber floated in Finland in the years 1928–52 and preliminary information on floating in 1953.**] *Metsät. Aikak.* 1953 (5), (119–22). [Fi.e.]

Statistics for floating over the period 1928–52 are given in graphs. There is no evidence that the rôle of floating will decrease in the near future and the development of floating channels should be considered of equal importance with that of railways and roads. Preliminary figures for 1953 show a steady decline in timber floated, estimated to be about 25% from that of 1952 although spring conditions were favourable. *From author's summary.*

342. Saarinen, O. Pinotavaran käsittely vientisatamissamme. [**The handling of cordwood in our ports.**] *Metsät. Aikak.* 1953 (5), (141–3). [Fi.]

343. **Problems of ocean freight of timber—modernization of junks as a solution.** *Docum. FAO Asia-Pacif. Comm. 1952* No. 6, 1952. pp. 4. 3 refs. Limited distribution: FAO, Rome.

A plea for investigation of the possibility of using Chinese-type junks for transporting timber in the Philippines, Indonesia etc.

38. FOREST ENGINEERING

383. *Roads and Bridges*

See also No. 330.

344. BURGAN, J. Návrh na komplexné riešenie lesníckych úkonov na strmých vel'kých stráňach. **[Tentative solution of [extraction] work in forest on wide steep slopes.]** *Lesn. Práce* 31 (10), 1952 (457–63). [Slovak.]

Recommends construction of 2-m.-wide transport tracks along slopes at average intervals of 120 m., thus making the maximum skidding distance 70–80 m. The tracks, with a gradient of 15%, lead to a cableway. If the loads do not exceed 50–70 kg., skidding from felling site to track can be replaced by gravity cable; it is also possible to use a Lasso-cable along the tracks instead of the usual wheel or sledge transport.

345. KÖHLER, R. Verwendung von Planierraupen beim Waldstrassenbau im Mittelgebirge. **[The use of caterpillar graders for forest road construction in moderately high mountains.]** *Forst u. Holz* 8 (12), 1953 (170–2). [G.g.]

A short report on operations and costs.

41. GENERAL TECHNIQUE OF FOREST PROTECTION. TYPES OF INJURY

411. *Natural and Biological Control*

See Nos. 59–64, 444–6, 452, 458, 461–2, 464–5, 473–6, 478, 481–2, 487–8, 491, 504, 506–7, 509, 511–4.

414. *Chemical Control*

See also Nos. 447–50, 486–7.

346. **Recommended common names for pest control products.** *Brit. Stand.* No. 1831: Part 1, 1952. pp. 16. Price 2*s.* 6*d.* C.F.B.

Covers insecticides, fungicides and herbicides.

415. *Other Means of Control*

347. **Digest of plant quarantine regulations.** *FAO Developm. Pap.* No. 23, 2nd ed., 1952. pp. 164.

Revised and brought up to date to August 1952. Covers 40 countries.

42. INJURIES FROM INORGANIC AGENCIES OTHER THAN FIRE

421. *Air Currents*

348. LINES, R. **The Scottish gale damage.** *Irish For.* 10 (1), 1953 (3–15). 6 refs.

Gives meteorological data, extent of damage, factors affecting the damage, and damage by species. General conclusions are the great importance of drain maintenance and of the edges and outlines of plantations (planted so as to be free of funnels). Choice of species is very important. Scots Pine is undoubtedly the correct species for the area (N.E. Scotland) but Douglas Fir will produce a greater volume by the time it is blown down.

349. STEVEN, H. M. **Wind and the forest.** *Repr.* from *Weather, London* 8, 1953 (169–74 + anemogram). 7 refs.

An account of the storm of 31 January 1953 and the damage done by it.

350. DAY, W. R. **The growth of Sitka Spruce on shallow soils in relation to root-disease and windthrow.** *Forestry* 26 (2), 1953 (81–95). 3 refs.

The paper considers in detail the evidence from the examination of some *Picea sitchensis*, 35 to 50 years old, and old enough therefore to begin to reflect the potentialities of the sites occupied, which are normally considered suitable for the species. The examination was made to ascertain what factors other than parasitic infestations or infections were acting to cause the thinning of crowns, the death of trees, and susceptibility to windthrow. In these shallow soils, factors of fundamental importance are those which determine the regularity of the supply of water and air, and it is considered that where, as in the cases examined, the soils are mainly intractable, early development of disease and of windthrow will have to be expected. [Cf. *For. Abstr.* 15 (No. 357).] *From author's summary.*

351. RUTH, R. H., and YODER, R. A. **Reducing wind damage in the forests of the Oregon coast range.** *Res. Pap. Pacif. Nthwest. For. Range Exp. Sta.* No. 7, 1953. pp. 30. 11 refs.

A study of damage in the Cascade Head Experimental Forest since 1948 and on 225 sample plots in the Oregon Coast Range in summer 1952 showed that: (1) Storm winds causing windthrow came from the S.S.W. (2) On the borders of clear-felled areas 93% of the wind damage occurred along the N. and E. boundaries, especially when these boundaries were on the leeward side of the ridge. (3) There was no correlation between wind damage and size of tract felled, but areas down to 2 acres and less sustained considerable loss. (4) In stands from which 16–24% of the volume had been removed in thinnings, losses from windthrow averaged 80 bd. ft./acre/year, while losses were heavy in other areas from which most of the dominant and co-dominant trees had been removed. (5) Douglas Fir and Sitka Spruce are more windfirm than Western Hemlock, and trees infected with root rot are particularly liable to windthrow. (6) Windthrow is more severe on areas with a high water-table or very shallow soil. (7) In virgin stands heaviest damage occurred on the lee side of ridges, beginning near the crest of the ridge and extending for some distance down the lee slope, and also on small ridges and level areas in the lee of higher ridges. Recommendations are made on felling practices to reduce windthrow.

352. DAVIDSON, A. G., and NEWELL, W. R. **Pathological deterioration in wind-thrown Balsam Fir in Newfoundland.** *For. Chron.* 29 (2), 1953 (100–7 + 6 photos). 4 refs.

Fifty wind-thrown trees were examined 3–4 years after death; 98% of trees examined showed incipient decay (average depth 0·5 in.); caused chiefly by *Stereum chailletii*; 22% showed advanced decay caused chiefly by *Lenzites saepiaria*.

422. *Temperature Influences. Frost. Heat. Drought*

See also Nos. 87, 520.

353. JACAMON, M. La gelée tardive du 11 mai 1953. **[The late frost of 11 May 1953.]** *Rev. for. franç.* 5 (7/8), 1953 (512–7).

Beech suffered much more severely than Oak, irrespective of the state of leaf. Late-flushing Firs (e.g. *A. nordmanniana*) which are usually safe from late frosts, suffered severely from this exceptional frost.

354. LENOIR, R. La gelée tardive du 10 mai 1953 et les essences exotiques en Basse Ardenne. **[The late frost of 10 May 1953 and exotic species in the Lower Ardennes.]** *Bull. Soc. for. Belg.* 60 (7), 1953 (357–61). [F.]

355. KONDA, K. **[Studies on frost injury to planted Todomatsu (*Abies mayriana*).]** *Res. Bull. exp. For. Hokkaido Univ.* 16 (2), 1953 (117–74). [Jap.e.]

Damage from late frost in a plantation was examined. Frost damage is frequent and if the tree is not killed its vigour and quality may be reduced. Damage begins in early May and is caused by temperatures of $-4°$ C. and under. Damage is mainly to the buds. *From author's summary.*

356. KRZYSIK, F. Wpływ przymrozków na kształtowanie się i przyrost drzew. **[Effect of late frosts on the habit and growth of trees.]** *Sylwan* 97 (2), 1953 (100–5). [Pol.e.russ.]

Frosts of $-2{\cdot}8°$ C. minimum temperature occurred between 19 and 23 May 1952, in the surroundings of Krynica, destroying the freshly developed Spruce buds and lateral shoots. The top parts of the stems, deprived of their laterals, formed in 1952 abnormally long and thick apical shoots which produced masses of large needles and, at the end of the growth period (early October), were studded with numerous buds. Measurements on 3 Spruce stems showed the 1952 apical shoots to be 2–3 times as long as those of 1951. In only one case was it considerably shorter, being developed from a lateral bud; this tree, which suffered from early frost both in 1951 and 1952, is markedly deformed, with a tendency to 'snakiness'. The author thinks that early frosts might be at least one reason for the cleanness of Spruce stems in mountain forests; at the same time, they can be responsible for the lusus *virgata.*

357. DAY, W. R. **The fungus flora of the main stem of standing trees.** *Rep. imp. For. Inst., Oxf. 1951/52,* 1953 (15).

Samples of Sitka Spruce from Aberdeenshire that had suffered from drought crack in 1947 showed general infection of the heartwood by *Fomes annosus.* In order to determine whether *F. annosus* was present over any wider area, standing trees were sampled in Pitfichie Forest. Both cracked and uncracked trees were sampled, and all the cracked and most of the uncracked trees had heartwood infected with mycelia. These have not been identified, but *F. annosus* was not present and it is unlikely that most of the mycelia are active in wood destruction. The points sampled in areas in which there were no cracked trees produced most of the sterile samples. Examination of soil profiles at the points sampled showed that the occurrence of drought crack was associated with only a shallow depth of soil permitting good root development, or with a subsoil which, though it permitted relatively deep rooting, was liable to become dry. Absence of drought crack was consistently associated with a relatively good depth of abundant rooting combined with a moist subsoil. [Cf. *For. Abstr.* 15 (No. 350).]

423. *Precipitations*

358. TANNER, H. Hagelschäden an Waldbäumen und ihre Folgen. **[Hail damage to forest trees and its consequences.]** *Schweiz. Z. Forstw.* 104 (6), 1953 (232–7 + 4 photos). 12 refs. [G.f.]

Illustrates the subject by data from a 50-year-old mixed Pine/Spruce/Silver Fir stand that was badly damaged by hail in 1924. When it was felled in 1950, the injured trees were easily distinguished by deformed stems and decay. Trees damaged by hail should be felled as soon as possible.

359. RILEY, C. G. **Hail damage in forest stands.** *For. Chron.* 29 (2), 1953 (139–43 + 11 photos).

Near Candle Lake, Saskatchewan, a severe hail storm damaged 70- to 80-year-old stands including mixed *Picea glauca, Populus tremuloides* and *Pinus banksiana,* and pure *P. banksiana.* Characteristic signs 7 years later included dead trees, particularly *P. banksiana:* dead tops; crowns partly dead and conspicuously thin on the side that faced the storm; open and healed wounds all on the same side of the tree, especially on the thin-barked upper parts, all traceable to the annual ring of the same year. *From author's summary.*

424. *Soil Conditions. Erosion Effects. Nutrient Deficiencies etc.*

360. **A bibliography on the application of plant nutrients by leaf spraying.** *Soils & Fertil.* 16 (4), 1953 (246–62).

A collection of abstracts, most, but not all, of which have already appeared in *Soils & Fertil.,* brought together and arranged with a separate section for each plant nutrient, and a short general section.

361. WELLS, J. S. **Iron sequestrene in the treatment of chlorosis.** *Amer. Nurserym.* 98 (1), 1953 (14, 57–8).

Iron sequestrene (salts of ethylene-diamine tetra-acetic acid—EDTA) has proved very promising in the treatment of Azaleas, *Citrus* trees etc. suffering from chlorosis due to Fe deficiency. Its residual action is much more lasting than that of $FeSO_4$.

43. FOREST FIRES

362. SPURR, S. H. **Forest fire history of Itasca State Park.** *Minn. For. Notes* No. 18, 1953. pp. 2.

Notes on the dating of forest fires by tree-ring studies.

431. *Predisposing Factors and Causes. Fire Danger. Fire Behaviour*

363. VILLENEUVE, G.-O. Application de la météorologie par The Laurentian Forest Protective Association Limited. **[The application of meteorology [to forest fire protection] by the Laurentian Forest Protective Ass. Ltd.]** *Bull. Bur. Mét. Québec* No. 23, 1952. pp. 55. 11 refs. [F.f.]

364. VILLENEUVE, G.-O. Les dangers d'incendie forestier à Squatteck, Cté Témiscouata, P.Q. **[Forest fire hazard at Squatteck, Temiscouata County, Quebec.]** *Bull. Bur. Mét. Québec* No. 24, 1953. pp. 20. 10 refs. [F.f.]

Analysis of forest fire hazard indexes for 5 consecutive years shows that the forest stands of the region present fire hazards in the following decreasing order of importance: (1) stands 1–2 years after exploitation, (2) stands 5 and more years after exploitation, (3) broadleaved stands, (4) mixed stands, and (5) slow-drying coniferous stands. May and June are the most dangerous months but

hazard is high in (1) and (2) throughout the fire season.

365. Countryman, C. M. **A pocket type humidity indicator for use in fire prevention and control.** *Misc. Pap. Calif. For. Range Exp. Sta.* No. 12, 1953. pp. 1.

The indicator consists of a $2\frac{1}{2} \times 3\frac{1}{2}$-in. card with 6 spots representing 7, 10, 20, 30, 40 and 50% humidity. The spots are treated with $CoCl_2$ solutions in different concentrations. When the relative humidity corresponds with any of the 6 values the colour of the corresponding spot is lavender, if the humidity is higher the spot will be pinker, and if lower bluer, than lavender.

366. Morris, W. G. **Fuel moisture indicator stick as guide for slash burning.** *Timberman* 54 (10), 1953 (128).

Records kept on 5 national forests west of the Cascade Range between 1949 and 1952 allow 63 different comparisons of slash fire behaviour for given fuel-stick moisture readings in the open slash and 100 ft. inside the adjoining green timber stand. Additional records and experience are needed, but the results indicate that, in spring or autumn, fires set in well-arranged fine slash will usually spread if a fuel stick exposed to sun in the slash area has 13 or 14% moisture content. On flat ground or with Hemlock slash, drier fuels are desirable. A fuel stick in the shade of adjacent green timber should have 18% m.c. or over to avoid difficulty in preventing and controlling spread into the timber by surface and spot fires. Conditions where a still higher m.c. is needed to prevent spread of the fire into the timber are discussed.

367. **Special fire hazards: forests.** *Rep. Fire Res. Bd., Lond. 1952*, 1953 (41–2).

In the course of a preliminary study of wetting agents undertaken for the Forestry Commission, observations were made of the remains of forest fires in Great Britain, of the later stages of the disastrous forest fires in France in 1949, and a few small experimental forest fires. The most striking lesson learned was the close similarity between fire situation in the forest and in buildings. Most fires of both types are put out at a relatively early stage and before much damage has been done, and the bulk of the loss is sustained through a small number of fires that get out of hand. Once a fire has reached this stage, it is beyond the normal means of fire-fighting, and examination of the remains showed that extinction was often achieved only when there was no more suitable combustible left. It was concluded that probably the only effective way of preventing extensive damage in forest fires is to apply a principle of fire grading similar to that used in buildings, and to divide the forest into units of a predetermined size by means of fire breaks or fire stops, which might take the form of a change in species or in age of crops.

432. *Prevention and Control*

See also Nos. 312, 367.

368. **Elements of forest fire control.** *FAO For. & For. Prod. Stud.* No. 5, 1953. pp. 110. 33 refs.

369. Colvill, L. L., and Everts, A. B. **An informal study of power-saw fires.** *Fire Control Notes* 13 (1), 1952 (1–5).

It is estimated that out of every 10 fires caused by power-saws in the forest, 3 are due to exhaust heat coming into contact with flammable material, 3 to a hot muffler or spark arrester coming into contact with flammable material, 2 to backfiring of engine and 1 each to candescent carbon sparks and miscellaneous causes (friction, shorting, etc.). Preventive measures are suggested.

370. Everts, A. B. **Fire extinguishers for use with power saws.** *Fire Control Notes* 13 (1), 1953 (6–7).

371. **[Firebreaks in N. Rhodesia.]** *Rep. For. Dep. N. Rhod. 1952*, 1953 (7).

Four kinds of firebreak were tested against an actual fire in a degraded *Baikiaea plurijuga* forest. The most effective break consisted of a 12-ft. road plus a 33-ft. ploughed line plus an outer fringe of 200 yd. of 'early burned' thicket forest. The cost of making this type was £32/mile, excluding overheads.

372. Luiten, I. H. **Power-saw motor drives portable fire pump.** *Fire Control Notes* 13 (4), 1953 (9–11).

The Weyerhaeuser Timber Co. have developed a coupling and mounting device which makes it possible in ca. 90 seconds to attach a standard low-speed, high-pressure pump to a power-saw motor. Further information on the equipment can be obtained from the Dept. of Public Information, Weyerhaeuser Timber Co., 1106 U.S. National Bank Bldg., Portland 4, Ore.

373. Such, S. **Michigan power-wagon plow.** *Fire Control Notes* 13 (2), 1953 (18–21).

Describes a hydraulically controlled fire-line plough mounted on the rear of a 4-wheel-drive lorry with power take-off.

374. Towell, W. E. **A tractor-drawn fire rake.** *Fire Control Notes* 13 (3), 1953 (28–9).

This new fire-rake is an adaptation of the Ferguson side-delivery hay rake, made for the Missouri Conservation Commission. It is adaptable to any power unit with a hydraulic lift system and power take-off.

375. **Care of [fire-fighting] tools and equipment.** *Protect. Bull. B.C. For. Serv.* No. 3, 1953. pp. 4.

435. *Benefits of Fire Control. Injurious Effects of Fire. Fire Losses*

376. Humbert, H. Le problème du recours aux feux courants. **[The use of brush fires.]** Institut Français d'Afrique Noire, Dakar 1952. pp. 11. [F.]

Discusses the ill effects on tropical rain forest of brush fires started on the neighbouring savanna, grassland etc.

436. *Beneficial Effects of Fire. Uses of Fire in Silviculture and Other Forms of Husbandry*

See also Nos. 199, 263, 366.

377. Little, S., Jr. **Prescribed burning as a tool of forest management in the Northeastern States [of**

the U.S.A.]. *J. For.* 51 (7), 1953 (496–500). 31 refs.
A review of literature.

378. HALLS, L. K., SOUTHWELL, B. L., and KNOX, F. E. **Burning and grazing in coastal plain forests: a study of vegetation and cattle responses to burning frequency in Longleaf-Slash Pine forests of Georgia.** *Bull. Ga. cst. Plain Exp. Sta.* No. 51, 1952. pp. 33. 11 refs.

Reviews previous literature on the subject and gives a detailed report on an experiment carried out to test the interaction of burning, grazing, and fire exclusion on natural regeneration of *Pinus caribaea* and *P. palustris* and on cattle production. Burning appears to be essential for maximum cattle production, but if employed frequently will impair *P. caribaea* regeneration. The present study indicates that with protection from fire *P. caribaea* regenerates satisfactorily. During this period grazing may be desirable to prevent the accumulation of fuel. After the trees are 10–15 ft. high, they can survive periodic controlled burning, which serves the double purpose of reducing fire hazard and improving forage.

44. DAMAGE BY HARMFUL PLANTS. VIRUS DISEASES

441. *Weeds*

See also Nos. 71, 199, 228–9, 267–9, 316–21, 346.

379. LAVENDER, D. P. **A preliminary report on tree planting as a gorse control measure.** *Res. Note Ore. Bd. For.* No. 11, 1953. pp. 9 + 1 map.

Gorse (*Ulex europaeus*) has spread in S.W. Oregon, where it now covers 25,000 acres. An experiment was made in controlling it by first burning and then planting various conifers. From preliminary results it is concluded that *Chamaecyparis lawsoniana* can compete with Gorse and might eventually eliminate it from planted areas.

380. HANSON, H. L. **Some observations on population dynamics of secondary woody vegetation.** *Proc. 9th ann. Nth. Cent. Weed Control Conf.* and *6th West. Canad. Weed Control Conf.* 1952 (51–3). O.R.E.

The response of woody vegetation was studied over a period of 5 years in a mixed Pine/hardwood forest, following the application of a foliage spray of 2,4-D (1½ lb. acid in 40 gal. water/acre). Observations of pioneer brush invasion were also made in 3 areas in Minnesota where the water level of lakes had been reduced and had left part of the former lake bottom exposed. The following general conclusions were drawn: (1) Between 5 and 10 years after complete killing of the aerial parts, Hazel will be replaced by a second stand of approximately the same density. (2) Hazel brush has a very slow rate of initial invasion by seedlings. (3) Alder is limited in its ability to invade new areas, because it requires a wet seedbed. (4) Raspberry and various Willow species have the greatest potential invasion rate of any of the brush species observed, but their rather definite site requirements hinder them in competition with other species.

381. JACOBSON, G. Buskbekämpning med kemiska medel. **[Brush control with chemicals.]** *Norrlands SkogsvFörb. Tidskr.* 1953 (2), (191–241). 25 refs. [Sw.sw.e.]

Summarizes results of research by Statens Jordbruksförsök during 1950–2, in different parts of Sweden, from Öland in the south to central Norrland in the north. Chemicals tested were commercial preparations consisting of 2,4-D derivatives, or 2,4,5-T derivatives, and mixtures of 2,4-D and 2,4,5-T esters. Results include the following: (1) Esters with low volatility e.g. butoxyethanol and propylene glycol butyl ether esters are more effective than those of higher volatility especially in preventing sprouting; 2,4-D alone was an inadequate preventive, a mixture of 2,4-D and 2,4,5-T was generally effective, and 2,4,5-T alone, especially in winter spraying, was often very effective. (2) For summer spraying, mixtures of 2,4-D and 2,4,5-T, and 2,4,5-T alone were completely effective only when all the foliage was thoroughly sprayed. July-August was the best time for spraying, and late July to the end of August was the most effective period for spraying Blackberry, Oak and Sloe. Spraying must be repeated after a year because of sprouting. (3) Application of the chemical in notches cut in stems with diam. 5 cm. and over was very effective, especially in treating Birch, and best results were obtained when the number of notches was reckoned at 1 to every 3 cm. stem diam. (4) A flame-thrower gave good results, but there was considerable sprouting. (5) Winter spraying, especially in December and January, gave better results than summer spraying. Spraying the root collar and up to 100 cm. prevented sprouting. Bushes taller than 100 cm. should be cut off at that height before spraying. Treating the cut surface of stumps is effective if done before the surface dries out. Application in notches (1 to every 3 cm. stem diameter) gave good results with equal parts chemical and diesel oil. Species treated are listed showing their susceptibility to treatment and the dosage recommended.

382. LEONARD, O. A. **Classification of woody plant responses to herbicides.** *Res. Progr. Rep. 13th West. Weed Control Conf.* 1952 (71–88). O.R.E.

Presents a table giving an alphabetical list of species, treatments, % kill, location of experiments and the individuals or organizations conducting them.

383. SUGGITT, J. W. **Recent research in chemical brush control.** *Proc. 9th ann. Nth. Cent. Weed Control Conf.* and *6th West. Canad. Weed Control Conf.* 1952 (59–63). O.R.E.

Summarizes the methods and results of experiments by the Hydro-Electric Power Commission of Ontario in (1) foliage spraying and (2) basal bark dormant-season treatments. Ammate at a concentration of 0·75 lb./U.S. gal. proved an economical and efficient non-selective spray, though its high cost, difficulties of handling and other factors render it a less attractive material than mixtures of 2,4-D and 2,4,5-T. A 2,4-D and 2,4,5-T (1 : 1) mixed-acids concentration of 0·25–0·35% in the ester form seems the most efficient foliage spray and should be

applied 20 to 70 days after flushing, or from the time of full leaf spread to the end of the period of most rapid growth. Increasing the 2,4-5-T content of the spray does not ensure a higher kill. A concentration of between 1·2% and 1·5% 2,4,5-T (acid basis) in an oil carrier applied in February to May at a rate of 60 gal./acre seems to be the most potent and economical spray solution for dormant basal bark treatment. Such treatment is superior to foliage sprays in the control of many resistant species.

384. Butler, C. C. **Undesirable woody plants on irrigation systems and irrigated lands.** *Res. Progr. Rep. 13th West. Weed Control Conf.* 1952 (63–70). O.R.E.

A series of abstracts are presented and the main points summarized. Willows are the most easily controlled species of those studied, both the amine and ester formulations of 2,4-D at relatively low rates, being satisfactory (*F. L. Timmons, W. H. Hirst* and *C. C. Butler*). Foliage sprays are most effective in early summer and dormant sprays in late autumn or early winter. Wild Rose is best controlled by 2,4,5-T spray mixtures or a mixture of 2,4-D and 2,4,5-T (*F. L. Timmons*). Foliage sprays made in the later bloom stage seem to give the best control. Aerial spraying of *Tamarix gallica* gave best results with 2,4-D amine salt at 2 lb. acid/acre with water and detergent or with 2,4,5-T low-volatile esters at 1½ lb. acid/acre with water (*J. G. Koogler*). [Cf. *For. Abstr.* 14 (No. 406).]

385. Elwell, H. M. **Brush control of hardwoods for grass production.** *Proc. 9th ann. Nth. Cent. Weed Control Conf.* and *6th West. Canad. Weed Control Conf.* 1952 (53–6). O.R.E.

Present the results of experiments in control of brush by foliage sprays, and basal bark and stump treatments, using different formulations of 2,4-D, 2,4,5-T, or combinations of the two, and Ammate. All gave stisfactory control within the limits for which each was best suited.

386. Bragg, K. K. **Progress report on Poison Ivy control.** *Proc. 5th Mtg. East. Sect. nat. Weed Comm. Can. 1951*, 1952 (76–8). O.R.E.

A report from an experimental area in Ottawa, sprayed in 1950 and resprayed in 1951. The second spraying was necessary in all plots receiving 2,4-D, 2,4,5-T, their mixture, and Ammate. Control in the second year was as good from comparable amounts of 2,4-D, as from 2,4,5-T or their mixtures. A rate of 24·8 oz./acre was as satisfactory as heavier rates. Ammate at 160 lb./acre gave as good control as the other components and appeared to stimulate grass growth. Concentrated Borascu, Polybor Chlorate and CMU [3-*p*-chlorophenyl-1, 1-dimethylurea] all gave good control for the year of treatment.

387. Wilson, J. S. **The importance of spray volume in the application of a basal bark spray.** *Proc. 5th Mtg. East. Sect. nat. Weed Comm. Can. 1951*, 1952 (60–1). O.R.E.

Tests with various concentrations at different rates of application showed that 20 lb. 2,4,5-T/100 Imperial gal. oil is the optimum for basal sprays of *Quercus alba*. Even when high concentrations are used, an adequate volume must be applied, to the point of run-off at ground level.

388. Leonard, O. A. **Result of cut-surface experiment on interior Live Oak.** *Res. Progr. Rep. 13th West. Weed Control Conf.* 1952 (53–4). O.R.E.

Various treatments in basal spraying of both cut and uncut surfaces were tested on *Quercus wislizeni*. All cut-surface treatments, whether with the ester of 2,4,5-T in diesel oil or with the amines of 2,4-D and 2,4,5-T without any diluent were effective in killing the trees. With larger trees the best treatment was 2 c.c. of 2,4,5-T amine per cut or a basal spray mixture of 4% 2,4,5-T ester in diesel oil. These results are only preliminary.

389. Offord, H. R., Moss, V. D., Benedict, W. V., Swanson, H. E., and London, A. **Improvements in the control of *Ribes* by chemical and mechanical methods.** *Circ. U.S. Dep. Agric.* No. 906, 1952. pp. 72 + 9 plates. 25 refs.

390. Offord, H. R., Moss, V. D., Quick, C. R., and Burrill, W. S. **Use of 2,4-D and 2,4,5-T for *Ribes* eradication in the western states.** *Res. Progr. Rep. 13th West. Weed Control Conf.* 1952 (46–7). O.R.E.

For selective spraying of *Ribes* in California in 1950–51 2,4-D 500 p.p.m. acid equivalent (AE), or 2,4-D 500 p.p.m. + 2,4,5-T 1000 p.p.m. was used to eradicate *R. roezlii* and *R. nevadense*. The mixed formulation is necessary for satisfactory kill of a varietal form of *R. roezlii* occurring at the northern end of the natural range of this species. Studies of dosage-volume factors related to broadcast spraying of young and old age-class *R. lacustre* and *R. viscosissimum* showed that effective dosages and volumes differ for young and old age-classes. Investigations on basal stem work showed that a 50/50 mixture of the low-volatile esters of 2,4-D and 2,4,5-T (2½% by weight (AE) of each) gave about 10% better kill of *R. roezlii* than 5% 2,4-D or 5% 2,4,5-T alone. Both dosage and volume are important in basal stem treatment. The use of oil-soluble dyes as markers greatly speeded crew work and facilitated checks. Two applications of 2,4-D at 50 p.p.m. AE on *R. roezlii* proved fully as effective as 1 or 2 treatments in which 10–20 times as much chemical had been used. [Cf. *For. Abstr.* 13 (No. 404).]

391. Jackson, G. **Tree eradication trials, Nyasaland.** *Abstracts and News Summary, Section C Herbicides, H.M.S.O., London* No. 7, 1953 (4–7). O.R.E.

An interim report on experiments to test the value of modern arboricides for the destruction of *Brachystegia/Isoberlinia* woodland in the Northern Province of Nyasaland. Various trials in the treatment of felled and standing trees were made. Sprays of 2,4-D, 2,4,5-T, MCPA and other chemicals were used. Results were all disappointing; the butyl ester of 2,4,5-T gave the best results.

392. Cox, D. K. **Relation of growth stage and season to toxicity of 2,4,5-T PGBE [propylene glycol butyl ether] ester applied to Velvet Mesquite.** *Res. Progr. Rep. 13th West. Weed Control Conf.* 1952

(47–8). [Southwestern Forest and Range Experiment Station, Tucson, Ariz.] O.R.E.

Spring is the best time for spraying *Prosopis juliflora* var. *velutina*, the most sensitive period being from the time the leaves reach full size and are succulent with catkins blooming, to the period when leaves are just beginning to harden and pods are from ¼ to 1½ in. long. [Cf. *For. Abstr.* 14 (Nos. 409–10, 2366).]

393. Cox, D. K. **Effect of wetting agents and concentration on toxicity of 2,4,5-T applied as a foliage spray to Velvet Mesquite.** *Res. Progr. Rep. 13th West. Weed. Control Conf.* 1952 (48–9). [Southwestern Forest and Range Experiment Station, Tucson, Ariz.] O.R.E.

Applications of 5000 p.p.m. of the amine or ester form of 2,4,5-T produced the highest kill of the concentrations tested. Addition of wetting agents increased toxicity. Water used as a carrier may produce results as good as oil or oil/water emulsions.

394. Cox, D. K. **Effect of soil moisture on reaction of Velvet Mesquite to topical application of selective hormone type herbicides.** *Res. Progr. Rep. 13th West. Weed Control Conf.* 1952 (50). [Southwestern Forest and Range Experiment Station, Tucson.] O.R.E.

Tests in spraying watered and unwatered sites showed no increase in top kill during any season due to additional soil moisture.

395. Fallis, K. E. **Progress report on the control of Buckthorn.** *Proc. 5th Mtg. East. Sect. nat. Weed Comm. Can. 1951* 1952 (125–7). O.R.E.

Cutting of *Rhamnus cathartica* followed by chemical treatment of the stump or coppice shoots is the most favoured method of treating hedges which may harbour the pathogen causing leaf rust of oats. Dry $NaClO_3$ or basal bark applications of 2,4,5-T are satisfactory when immediate removal of the dead shrub is not necessary.

396. Waywell, C. G. **A progress report on foliage sprays and bark treatments.** *Proc. 5th Mtg. East. Sect. nat. Weed Comm. Can. 1951*, 1952 (116–9). O.R.E.

A table shows the effects of basal bark treatments of *Crataegus* spp. with different preparations at various concentrations in soil or water.

397. Arend, J. L. **Scrub Aspen control with basal sprays.** *Tech. Note Lake St. For. Exp. Sta.* No. 401, 1953. pp. 1.

Tests in lower Michigan indicated that Aspen suckering can be controlled successfully when the base of the tree is thoroughly wetted to a height of 2–3 ft. with a mixture of equal parts 2,4-D and 2,4,5-T esters in diesel oil (12lb. acid to 100 gal. oil) applied after full leaf development in late June, July and August.

398. Nelson, T. C. **Honeysuckle is a serious problem.** *For. Fmr.* 12 (11), 1953 (14–6).

Lonicera japonica has escaped from cultivation and established itself in woods and thickets from Connecticut to Florida. In the lower Piedmont it threatens to become a critical factor in the regeneration of *Pinus taeda*. Notes are given on possible means of control (grazing, spraying, cutting etc.).

399. Goonewardene, W. E. S. **The control of *Lantana* in a plantation of *Eucalyptus* spp.** *Ceylon Forester* (*n.s.*) 1 (2), 1953 (123–4).

The results of trials indicate that beating down and burning is the most effective method of controlling *Lantana aculeata*. Cutting the *Lantana* low and poisoning the stumps with Na arsenite was effective but more expensive and difficult of execution. Of sprays, Fernoxone (20 lb. in 40 and 80 gal. water/acre) was more effective than $NaClO_3$ (40 gal./acre).

442. *Parasitic (Higher) Plants. Climbers and Epiphytes*

400. **Preliminary studies of dwarf mistletoe in Ponderosa Pine.** *Rep. Pacif. Nthwest. For. Range Exp. Sta. 1952*, 1953 (38).

Studies indicated that the main spread is from overstorey to understorey trees, and that lateral spread through stands of even height is slow. Overstorey infection sources were not easily recognized since old brooms, especially in the lower crown, often proved to be less serious centres of infection than the less obvious but more dangerous diffuse infections. A few virulent overstorey infections were responsible for severe understorey damage over a considerable area. Heaviest infection was directly under the overstorey tree, usually within one chain; lighter infections may extend to as much as 2 chains to windward. Preliminary classifications of types of overstorey and understorey infection have been developed. A few trials of selective herbicides have been started. [Cf. *For. Abstr.* 14 (No. 2374).]

443. *Fungi and Bacteria*

See also Nos. 346, 519.

443.2. Diseases of Seed and Seedlings; Damping Off etc.

See also No. 204.

401. Vaartaja, O. **'Red patch' disease in seedbeds.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 9 (4), 1953 (3).

A red discoloration of needles of *Picea glauca* appeared in patches in nursery seedbeds in 1949–53 after the snow had melted. It was associated with a mould growing in the snow, and it is suggested that the disease is caused by *Phacidium infestans*, though no fruiting bodies of this fungus have yet been found.

402. Ito, K., and Hosaka, Y. **[Grey moulds on Japanese Larch seedlings.]** *Bull. For. Exp. Sta., Meguro, Tokyo* No. 59, 1953 (33–48). 8 refs. [Jap.e.]

Grey mould commonly found attacking seedlings in late spring to early autumn was identified as *Botrytis cinerea*. Another *Botrytis* sp. occasionally found on the seedlings differed considerably from *B. cinerea* in morphological and physiological characters. [Legends to photographs, drawings and tables are given in English.] *From authors' summary.*

403. NOHARA, Y., and ZINNO, Y. **[Researches on the prevention of needle blight of Sugi (*Cryptomeria japonica*) (II).]** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 62, 1953 (47–58). 14 refs. [Jap.jap.e.]

[Cf. *For. Abstr.* 14 (No. 426).] The following results were obtained from experiments in 1951–2: (1) Of many fungicides tested, Bordeaux mixture gave the best results, irrespective of its concentration in the range tested. (2) None of 10 dusts was so effective. (3) With Bordeaux mixture, June–September spraying was most effective, particularly in July and August. *From authors' summary.*

404. MÜLLER, R. Zur Frage des Pappelrindentods. **[Poplar bark disease.]** *Schweiz. Z. Forstw.* 104 (9), 1953 (408–28). 8 refs. [G.g.f.] [Pappelinstitut, Brühl bei Köln.]

Young plants of several Poplar hybrids (1-year 'Bachelieri' and 'Rema', and 2-year 'Leipzig' and 'Harff') were artificially infected with *Cytospora chrysosperma* and *Dothichiza populea*. The 'Leipzig' and 'Rema' Poplars did not develop any disease, but 'Bachelieri' developed disease in the twigs, and 'Harff' in both twigs and stem. An unexpected finding was that affected plants had all been attacked by *C. chrysospora* and not by *D. populea* though spores of the latter were abundantly represented in the infective material.

From this experiment the author concludes that only damaged plants are infected and that therefore injuries to seedlings in nursery transplant beds, or by cultivation after planting, must be reduced to a minimum. In particular, a long period of heeling in should be carefully avoided since this reduces the turgescence of the plants. Fully turgescent plants rarely succumb to this disease. If plants have been heeled in, they should be soaked, if possible in running water, for 48 hours before planting out.

443.3. Diseases of Older Stages

See also No. 357.

405. BAUER, F. Neue Pilzschäden an der Roteiche. **[New fungus diseases of *Quercus borealis*.]** *Forst u. Holz* 8 (12), 1953 (167–8). [G.]

Notes on (1) an unidentified species of *Myxosporium* and (2) an unidentified species of *Phoma*.

Stem, Butt and Root Rots; Root Diseases

See also Nos. 201, 350, 352, 357, 472, 545.

406. BAGCHEE, K. **The fungal diseases of Sal (*Shorea robusta* Gaertn). Part I. Leaf spot (*Cercospora* sp.), stem canker (*Macrophoma shoreae* sp. nov.), sooty moulds (*Capnodium* sp. and *Meliola* sp.), and root and stem rot (*Xylaria* spp.) of Sal.** *Indian For. Rec.* (*Mycology*) 1 (2), 1953 (12–23 + 3 plates). 11 refs.

Price *Rs.* 1 *as.*4 or 2*s.*

407. NORDIN, V. J., SUTTON, W., and HEMING, J. W. **Red stain and decay of Lodgepole Pine in Alberta.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 9 (3), 1953 (4).

An unidentified fungus, 'Unknown L', was isolated in 85% of specimens of red-stained heartwood of Lodgepole Pine. *Fomes pini*, hitherto considered to be the main cause of this condition, was found in only 6% of specimens. Other infections were a brown cubical rot associated with *Coniophora puteana* and a white pitted decay associated with *Polyporus abietinus*.

408. ***Fomes annosus* (Fr.) Cooke.** *Distr. Maps Plant Dis.* No. 271 (rev.) 1953. pp. 2.

409. BAGCHEE, K. **Pathological note No. 6. New and noteworthy diseases of trees in India. The sap and heartrot disease of *Eucalyptus maculata* Hook., var. *citriodora* Bailey [*E. citriodora*] due to the attack of *Trametes cubensis* (Mont.) Sacc.** *Indian For.* 79 (6), 1953 (341–3 + 4 photos). 2 refs.

410. HUBERT, E. E. **A study of recently killed trees in the Western White Pine type.** *J. For.* 51 (9), 1953 (624–7). 5 refs.

Gives results of analysis of 578 trees (416 *Pinus monticola*) recently dead in N. Idaho and W. Montana. It was found that 67·1% were heavily infected with *Armillaria mellea*. Only 3·5% were infected with *Poria subacida*, and 4·6% showed primary attack by barkbeetles.

411. KRZYSIK, F. Zagadnienie świerka odpornego na działanie opieńki. **[The problem of the resistance of Spruce to *Armillaria mellea*.]** *Sylwan* 97 (1), 1953 (23–5). [Pol.russ.e.]

Suggests a comprehensive investigation of the resistance to *A. mellea* of Spruce in the remnants of primeval Spruce/Fir forests in S.W. Poland, which appear to be much more resistant than plantation Spruce from imported seed.

Wilts, Diebacks etc.

See also No. 167.

412. BARNETT, H. L. **Isolation and identification of the Oak wilt fungus [*Chalara quercina*].** *Bull. W. Va. agric. Exp. Sta.* No. 359*T*, 1953. pp. 15.

Describes a method that usually permits positive determination of Oak wilt within 3–5 days after Oak chips have been cultured. [Cf. *For. Abstr.* 13 (No. 3105).]

413. ZUCKERMAN, B. M., and CURL, E. A. **Proof that fungus pads on Oak-wilt killed trees are a growth form of *Endoconidiophora fagacearum* [the perithecial stage of *Chalara quercina*].** *Phytopathology* 43 (5), 1953 (287–8). 3 refs.

Cf. *For. Abstr.* 14 (No. 3076); 15 (No. 104).

414. FOWLER, M. E. **The status of Oak wilt.** *Abstr.* in *Phytopathology* 43 (7), 1953 (406).

The best control of *Chalara quercina* which can now be recommended in the U.S.A. is the destruction of infected trees in areas where disease % is small and the value of the timber high. [Cf. *For. Abstr.* 14 (Nos. 2396–9).]

Cankers, Stem Rusts etc.

See also Nos. 406, 850.

415. DENYER, W. B. G. ***Cephalosporium* canker of Western Hemlock.** *Canad. J. Bot.* 31 (4), 1953 (361–6 + 5 photos). 3 refs. (*Contr. Div. For. Biol. Dep. Agric. Can.* No. 82). O.R.S.

Describes a canker on suppressed *Tsuga heterophylla* and the *Cephalosporium* sp. isolated from it. Inoculation of the tree with this fungus

produced cankers similar to those of natural origin. Attempts to produce the perfect stage of the fungus in culture failed.

416. ROBAK, H. Über saprophytische und parasitische Rassen des Lärchenkrebspilzes *Dasyscypha willkommii* (Hart.) Rehm. **[Saprophytic and parasitic strains of the Larch canker, *D. willkommii*.]** *Z. Forstgenet.* 2 (5), 1953 (104–6). 4 refs. [G.]

Spores from (1) cankers and (2) dead branches of affected trees proved to be two genetically distinct strains of *D. willkommii*.

417. FOWLER, M. E. **Surveys for Larch canker.** *Abstr.* in *Phytopathology* 43 (7), 1953 (405–6).

A re-survey in 1952 in the U.S.A. for the canker caused by *Dasyscypha willkommii* showed that its occurrence is now rare.

418. JONES, D. R. **Studies on a canker disease of Cypresses in East Africa, caused by *Monochaetia unicornis* (Cooke and Ellis) Sacc. 1. Observations on the pathology, spread and possible origins of the disease.** *Ann. appl. Biol.* 40 (2), 1953 (323–43 + 1 plate). 14 refs. O.R.E.

The disease was first observed in Kenya in 1942 and has now been recorded in nearly all the Cypress-growing areas of Kenya, Tanganyika and Uganda, in Rhodesia and the Union of South Africa, outbreaks appearing to have followed the direction of the S.E. monsoon. Infections begin during humid weather; the acervuli ripen and conidia are liberated 3–8 weeks after the rains begin. The cankers are formed in the bark and sapwood, spread quickly up and down and frequently girdle the stem or branch. The fungus exists in nature in 3 strains having different levels of virulence, growth-rate in culture, size of acervuli and conidia, and retention of viability in conidia. In Kenya different levels of virulence east and west of the Great Rift Valley have been observed, associated with differences in climate. Trees 2 years old are the most susceptible; older trees are only infected in the rapidly growing parts. *Cupressus macrocarpa* is more susceptible than *C. lusitanica*, the latter species becoming infected only when it grows close to diseased *C. macrocarpa*. Occlusion of the cankers occurs in both species, but is more effective in halting the spread of the fungus in *C. lusitanica*. It is suggested that the disease originated from a single focus and may represent the mutation of a strain of *Monochaetia unicornis* parasitic on Cypresses, from a strain only parasitic on an indigenous host, *Juniperus procera*. [Cf. *For. Abstr.* 13 (No. 1338); 14 (No. 440).] *From author's summary.*

419. **Sooty bark disease of Sycamore: *Cryptostroma corticale*.** *Leafl. For. Comm., Lond.* No. 30, 1952. pp. 7. Price 9*d*.

Illustrated by 2 colour plates. [Cf. *For. Abstr.* 13 (No. 3990).]

420. ***Cryptostroma corticale* (Ell. and Everh.) Gregory and Waller.** *Distr. Maps Plant Dis.* No. 272 (rev.) 1953. pp. 2.

421. ANDERSON, R. L. ***Hypoxylon* canker of Aspen in the Lake States.** *Tech. Note Lake St. For. Exp. Sta.* No. 400, 1953. pp. 1.

Correlations between incidence of canker and such factors as site quality and tree density are discussed [cf. *For. Abstr.* 14 (No. 1321)]. Practical conclusions are that stands on poor sites should be converted to species better adapted to such sites and stands on better sites should be maintained at 70% full stocking and over.

Foliage Diseases

See also No. 406.

422. ITO, K., and KOBAYASHI, T. **Contributions to the diseases of Poplars in Japan. II. The *Cercospora* leaf spot of Poplars with special reference to the life history of the causal fungus.** *Bull. For. Exp. Sta., Meguro, Tokyo* No. 59, 1953 (1–32). 24 refs. [E.e. jap.]

Cf. *For. Abstr.* 13 (No. 433).

423. ***Diptocarpon rosae* Wolf.** *Distr. Maps Plant Dis.* No. 266 (revised), 1953. pp. [2]. [Commonwealth Mycological Institute, London.]

424. ***Stereum purpureum* (Pers. ex. Fr.) Fr.** *Distr. Maps Plant Dis.* No. 30 (2nd ed.) 1953. pp. [2].

444. *Virus Diseases*

425. BAWDEN, F. C. **Plant viruses and virus diseases.** Chronica Botanica Co., Waltham, Mass. 3rd ed. (rev.) 1950. pp. xv + 335. Many refs. Price [£2. 8*s*.].

In preparing this edition, one additional chapter and many new illustrations have been added, and the text has been almost entirely rewritten. Although the same general format has been maintained as in earlier editions, this is largely a new book rather than another edition. *From author's preface.*

45. DAMAGE BY ANIMALS

426. GUSEV, V. I., and RIMSKIĬ-KORSAKOV, M. N. Klič k určování škůdců lesních a okrasných stromů a keřů evropské části SSSR. **[Key for the determination of injuries [caused by insects and other animals] to forest and ornamental trees and shrubs in the European part of the U.S.S.R.]** Státní Zemědělské Nakladatelství, Prague, 1953. pp. 535. [Cz.] Price *Kčs* 30. I.F.B.

Translated by K. Čermak from the Russian original [see *For. Abstr.* 4 (192)] with an addendum covering some pests not included in the key, but important in Czechoslovakia. Four indexes cover (1) Czech tree names; (2) Latin tree names with Russian and Czech equivalents; (3) Czech names of pests (many coined by the translator); (4) Latin names of pests with Russian and Czech equivalents.

451. *Mammals*

See also Nos. 65–7, 235, 270.

427. VIETINGHOFF-RIESCH, FRHR. VON. Ist der Siebenschläfer ein Forstschädling? **[Is the fat dormouse a forest pest?]** *Forst u. Holz* 8 (15), 1953 (218–9). 2 refs. [G.]

Although the fat dormouse [*Glis glis*] damages buds, young bark and hardwood leaves, serious damage is not likely to occur, because the distances

travelled by the mice are very restricted, and populations are kept low by numerous predators. Ring-barking by *G. glis* has never been observed by the author.

428. **The grey squirrel: a woodland pest.** *Leafl. For. Comm., Lond.* No. 31, 1953. pp. 16. Price 9*d*.
Habits, distribution in Great Britain, damage, and control.

429. SCHEFFER, T. H. **Spring incidence of damage to forest trees by certain mammals.** *Murrelet, Seattle* 33 (3), 1952 (38–41). B.A.P.
An account of damage to trees in the Puget Sound region by: (1) *Sciurus griseus* (grey squirrel), girdling *Pseudotsuga* sp. and *Pinus ponderosa*; (2) *Aplodontia rufa* (woodchuck), 'pruning' and gnawing bark of almost any species; and (3) *Ursus americanus*, barking second-growth Fir and Hemlock.

430. TEVIS, L., JR. **Effect of vertebrate animals on seed crop of Sugar Pine.** *J. Wildlife Mgmt.* 17 (2), 1953 (128–31). 4 refs. B.A.P.
On 5 dates between 14 August and 23 September, numbers of healthy cones on marked *Pinus lambertiana* in a stand in Plumas County, Calif., were counted and the fate of casualties was noted. Past selective logging had opened up the stand and favoured wildlife. Of an original count of 1656 healthy cones, 54% were cut by squirrels (*Tamiasciurus douglasii*), and 34% destroyed by woodpeckers (*Dendrocopas albolarvatus*). Average number of cones opening per tree was 10. These were attacked by jays (*Cyanocitta stelleri*). Cones cut and dropped by squirrels and opening on the ground were attacked by nuthatches (*Sitta carolinensis* and *S. canadensis*) and mountain chickadees (*Parus gambeli*), and scattered seeds were taken by chipmunks (*Eutamias amoenus*, *E. speciosus* and *E. townsendii*) and by white-footed mice (*Peromyscus maniculatus*). Of the estimated potential crop, practically no seed survived.

431. SPENCER, D. A., and KVERNO, N. B. **Research in rodent control to promote reforestation by direct seeding. Progress Report No. 3.** Fish and Wildlife Service, U.S. Department of the Interior, Washington. [1953]. pp. 56 + 29 tbls. + 14 dgms. + 17 gphs.
Deals mainly with the use of 'tetramine' (= tetramethylene disulpho tetramine) as a treatment for tree seeds to prevent their consumption by rodents. The following subjects are dealt with: Laboratory studies (the acetone carrier, the tetramine-acetone solution, length of seed exposure to treating solutions, delayed effect of tetramine treatment, influence of post-ripening on treated seed, protection of seedlings grown from treated seed); seed treatment formula for Douglas Fir, Ponderosa Pine, and Sand Pine; tetramine seed treatment for other coniferous tree species; preparation of supplemental tetramine-poisoned wheat bait; weathering characteristics of tetramine-treated seed; effect of tetramine-treated seed on the small mammal population; germination of tetramine-treated Douglas Fir seed in field tests; spring sowing of tetramine-treated Ponderosa Pine.
The results of the spring-planting tests of treated Ponderosa Pine seed were most favourable. A tetramine seed treatment for experimental trial is now available for Douglas Fir, Ponderosa Pine, and Sand Pine (*P. clausa*). Treatment of *P. jeffreyi*, *P. banksiana*, and *P. strobus* appears to be favourable, but tests have so far been made only on seed from a single source. The behaviour of *P. lambertiana*, *P. taeda*, and *Picea sitchensis* seed is erratic when subjected to the present techniques.
Tests indicate that the treatment should not be used on *Picea glauca*, *P. engelmanni*, *P. mariana*, or *Pinus resinosa* seed. Tests have shown that whatever injury to seed occurs, is due not to the tetramine but to the acetone carrier. Experiments are now being made on the addition of growth-promoting substances to acetone solutions in order to nullify their inhibiting effect on germination. An outstanding discovery is that tree seedlings grown from tetramine-treated seed are also protected from mouse feeding for the first few weeks after germination.

432. SCHINDLER, U. Die Erdmaus (*Microtus agrestis*), ein gefährlicher Forstschädling. [***M. agrestis*, a dangerous forest pest.**] *Repr.* from *Der Praktische Desinfektor, Dresden* 1953 (2/3). pp. [4]. Numerous refs. [G.g.]
[Cf. *For. Abstr.* 14 (No. 2423).] The depredations of *M. agrestis* in north-western Germany are attributed to the widespread clear fellings made during the war, which created conditions favourable for the increase of the rodent. No reduction in populations is likely until normal conditions obtain once more. Control measures are briefly outlined, but further research is needed.

433. GERSDORF, E. 2. Mitteilung über Versuche mit Erdmäusen (*Microtus agrestis*). [**Second report on trials with *M. agrestis*.**] *Anz. Schädlingsk.* 26 (7), 1953 (109–11). 2 refs. [G.]
[Cf. *For. Abstr.* 14 (No. 3501).] Reports further results of the original experiment and those of later similar trials. The results are inconclusive, but, on the whole, the treatments had a repellent action. The most effective material is a thin quick-drying paste, containing a rapidly acting poison.

434. UDAGAWA, T. [**Studies on the extermination of field mice. I. Movement and behaviour of *Apodemus s. speciosus*.**] *Bull. For. exp. Sta., Meguro, Tokyo* No. 59, 1953 (49–56). 11 refs. [Jap.jap.e.]
Gives figures, based on trapping in a pure forest of *Chamaecyparis obtusa* and in a mixed forest, for population density at different seasons, sex ratio, age and development of young mice, and area range of the mice. Concludes from the results that poison should be put down in July–August, in selected places rather than scattered throughout the forest. *From author's summary.*

435. UDAGAWA, T. [**Studies on the extermination of field mice. 2. The quantity of poison and the type of bait.**] *Bull. For. Exp. Sta. Meguro, Tokyo* No. 60, 1953 (81–8). 7 refs. [Jap.e.]

Experiments on the capacity of a mouse's stomach and observations on methods of feeding suggest that poison should be used at a rate of 0·05 mg. $CH_2FCOONa$ to one bite (= 0·05 mg.) of food. Maize or wheat is preferable as bait to food not naturally available to the mice. *From author's summary.*

436. Bykovskiĭ, V. A. Predposevnaja obrabotka želudeĭ fosfidom cinka s celju ih zaščity ot suslikov i drugih gryzunov. [**Pretreatment of acorns with zinc phosphide as a protection against *Citellus pygmaeus* and other rodents.**] *Dokl. vsesojuz. Akad. sel.-hoz. Nauk Lenina* 17 (12), 1952 (21–3). [Russ.] A.P.B.

Preliminary trials were made in 1950 in the Gorodishchensk district, Stalingrad Province, using 'Granosan', hexachlorane, naphthalene, pyridine or spent motor oil to treat acorns or the soil of seed-spots, all of which proved ineffective as a protection against *C. pygmaeus*. In further experiments in the same district in 1951, acorns were moistened with liquid flour paste and then mixed with equal parts of Zn_3P_2 (5 or 10% of the weight of the acorns) and wood ash. Sowing trials in the nursery showed that neither of these treatments impaired germination or growth of seedlings. Field trials were also made of similarly treated acorns (10, 7·5, and 5% Zn_3P_2), mostly in old fallow heavily populated with *C. pygmaeus*. With the 10% treatment 71–73%, and with the 5%, 49–62% of the acorns were untouched after 58–96 days, compared with 2·8–5·1% for controls. Preliminary experiments have also been made with possible repellents, viz. hexachlorane, naphthalene, and aqueous solutions of pyridine and trimethylamine added to a Zn_3P_2 treatment, in an attempt to reduce the proportion of the latter to 5%. The last two substances were too volatile to have any lasting effect, but results with 2·5% of either of the first two have been more promising, preserving respectively 66 and 78% of the acorns from attack, though somewhat retarding germination.

437. Detroux, L., and Fouarge, J. Essai de protection des plants forestiers contre les dégâts du petit gibier (lapin et lièvre). [**An experiment in the protection of forest plantations against damage from small game (rabbit and hare).**] *Bull. Inst. agron. Gembloux* 20 (3/4), 1952 (188–222 + 4 photos). [F.] E.M.B.

In this experiment, 180 young trees each of 17 species, were planted out in a forest clearing, fenced against deer but accessible to rabbits and hares, and treated with a number of repellents over 2 seasons. The species tested were Beech, Ash, 'Canadian' Poplar, White Poplar, Hornbeam, Pedunculate Oak, Red Oak, Sweet Chestnut, Sycamore Maple, Alder [*Alnus glutinosa* and *A. incana*], Japanese Larch, Birch, Robinia, Hazel, Willow [*Salix caprea*], and Choke Cherry [*Prunus virginiana*]. The 10 repellents were coal tar, creosote, creosite, raw carbolineum, wood tar, fish oil, two commercial products (Spraymoline and Rodinol), and two laboratory preparations (10% carbolineum + 5% Ca caseinate in an aqueous emulsion and 10% carbolineum + 10% Goodrite P.E.P.S. in an aqueous solution). One set of plants of each species was treated by wrapping the stems, to a height of about 60 cm., in a sleeve of kraft paper fastened by three ligatures of hemp. A twelfth set was left untreated as controls. The results of the experiment are analysed and presented in a number of tables (1) for the various treatments, and (2) for the individual species.

Of the 10 repellent treatments only 5 proved able to protect young trees by a single annual application —coal tar, creosite, creosote, carbolineum and wood tar—and these must be applied with caution since they tend to injure the trees if used in any but small quantities. The repellent action of the other substances soon wore off. The kraft-paper sleeve gave complete protection, and will last for two winters, but has the disadvantage of making the bark increasingly chlorotic and tender, and exceptionally attractive to rabbits when it is uncovered by the disintegration of the paper.

438. Krefting, L. W. **Snowshoe hare damage to a Jack Pine plantation in Minnesota.** *Tech. Note Lake St. For. Exp. Sta.* No. 402, 1953. pp. 1.

Measurements from areas protected against hares and deer, and control areas planted with 2 + 0 stock in 1949 [cf. *For. Abstr.* 13 (No. 1977)] show that damage by deer has been slight but that by hares extensive although no seedlings have died. The greatest damage has been loss of height (1951 averages of 0·87 and 0·97 ft. on unprotected and 1·95 ft. on protected areas).

439. McCullogh, J. M. **Deer—or timber?** *Pennsylvania Game News, Harrisburg* 23 (6), 1952 (30, 35). B.A.P.

Studies of damage caused by deer were made in fenced and unfenced areas in 4 different counties of Pennsylvania, representing 4 different forest cover types: clear-felled Virginia Pine [*Pinus virginiana*]; clear-felled Aspen [*Populus* sp.]; clear-felled, and immature and old-growth Beech/Birch/Maple; and a bulldozed area of Chestnut Oak [*Quercus montana*]. Where deer populations were light (ca. 1 deer/75 acres) only 0–7% of stems were heavily browsed and 5–44% lightly. Where populations were heavier (ca. 1 deer/35 acres) 25–78% of the forest was heavily browsed and 14–50% lightly. Natural regeneration was inadequate on all unfenced areas. Good and profitable forest management would be impossible on all areas with a heavy deer population.

440. [**Electric fences.**] *Rep. For. Dep. Uganda 1952*, 1953 (7).

A single-strand electrified fence at Katwe continued to be efficacious against elephant and other large mammals. Multiple-strand fences were also erected at Budongo and Opit to protect new close-planting plots against both large and small game. These somewhat elaborate fences (5-strand fence with 3 live wires) proved entirely effective, and a simpler design may possibly prove adequate: maintenance of current in the electrified wires was sometimes difficult, and at Budongo spiders' webs caused leakage when damp.

452. *Birds*

See No. 430.

453. *Insects*

See also Nos. 46–55, 58–64, 346, 426.

441. WIEGAND, H. Prognoseuntersuchungen über das Auftreten von Kieferninsekten im Jahre 1953. **[Investigations for the purpose of forecasting the occurrence of Pine pests in 1953.]** *NachrBl. dtsch. PflSchDienst.* 7 (5/6), 1953 (113–5). 3 refs. [G.]

A forecast affecting Thuringia, Saxony and the Kottbus region, and based on December counts of overwintering insects.

442. VANDERPLANK, F. L. **Causes of Coconut nutfall and gumosis.** *Nature, Lond.* 172 (4372), 1953 (315–6). 3 refs. [Insect Research Scheme, Agriculture Department, Zanzibar.]

During investigations into methods of combating the coreid bug, *Theraptus* sp. [cf. *For. Abstr.* 13 (Nos. 1413, 2289)] at least 3 other insect pests were found to cause nutfall and gumosis of immature nuts—the larva of the weevil *Diocalandra frumenti*, the larva of the moth *Lamoria* sp., and the ant *Polyrhacis schistacea*. Notes are given on control.

443. KALSHOVEN, L. G. E. **Important outbreaks of insect pests in the forests of Indonesia.** *Trans. 9th int. Congr. Ent., Amsterdam 1951* 2, 1953 (229–34). [E.] I.I.E.

Discusses: defoliation of Teak forests and of other cultivated forest trees in Java, of Pine forests in Sumatra and of other natural forests, and mass attacks on standing trees by wood-boring Scolytidae.

444. ATKINSON, D. J. **The natural control of forest insects in the tropics.** *Trans. 9th int. Congr. Ent., Amsterdam 1951* 2, 1953 (220–3.) [E.] I.I.E.

Discusses examples of epidemic and endemic damage by insects to trees in natural and in plantation conditions.

445. DOWDEN, P. B. **Natural control of forest insects in the United States.** *Trans. 9th int. Congr. Ent., Amsterdam 1951* 2, 1953 (215–9). 9 refs. [E.e.] I.I.E.

Discusses the relationship of natural control to artificial control and silvicultural practices, and the transfer of natural control agents affecting forest insects from one part of the country to another.

446. GÖSSWALD, K. Die rote Waldameise und ihre Vermehrung im Dienste der Waldhygiene. **[The red ant and its propagation in the service of forestry.]** *Trans. 9th int. Congr. Ent., Amsterdam 1951* 1, 1952 (700–4). [G.] I.I.E.

[Cf. *For. Abstr.* 14 (No. 3518).] A general discussion on the value of colonies of red ants in the forest.

447. BUCK, H. Die Einwirkungen von Frassgiften in subletaler Dosierung auf Spinnerraupen. **[The effects of stomach poisons in sublethal doses on *Euproctis chrysorrhoea*.]** *Forstwiss. Cbl.* 72 (7/8), 1953 (221–33). 15 refs. [G.g.]

Tests for possible effects of certain As-free insecticides on harmless or useful insects accidentally coming into contact with them, not necessarily at lethal doses, were made with 3 preparations: (1) F 113, (2) CI of Schering A.G., Berlin, and (3) Hö 2584 of Hoechst, Frankfurt/Main, all containing a chlorinated nitro-carbazole; they were compared with (4) Ca arsenate (25% As) in their effects on *E. chrysorrhoea* larvae in the final and penultimate instars. (4) proved most lethal of all. Concentrations of 1% of the chlorinated nitro-carbazole preparations were needed to kill larvae in the final stage—about 4 times as much as (4). Insecticides (1) and (3) were more effective than (2). Lethal effects of (1) and (3) were more rapid than those of (4). Considerable growth retardation in larvae was caused by (2) in concentrations of 1 and 2%, and, with (4) weight losses also. (3) caused pupation to occur 5 or 6 days later than normal, with some pre-pupal mortality. Weights of pupae seemed to be affected by (3), (2) and (4) but no pupae were killed. Treatments with (1), (2) and (3) caused a decrease of 85–38% in egg production, (3) having the greatest effect after (4). Egg production was reduced by $\frac{1}{2}$ to $\frac{2}{3}$ with 0·5% (1), by nearly $\frac{1}{2}$ with 0·25% (3) and was completely inhibited by 0·13% (4). No emergence took place from 10–15% of eggs from treated insects, compared with 5% in controls.

448. KRAMM, E. Die Tiefenwirkung einiger Kontaktinsektizide im pflanzlichen Gewebe. **[The deep-working effect of some contact insecticides in plant tissue.]** *Z. PflKrankh.* 60 (1), 1953 (20–6). 13 refs. [G.g.] E.M.B.

The insecticides used were Bladan [a thiophosphate preparation], an ester preparation with a basis of E 605 [parathion], and an emulsion preparation with a basis of HCCH (γ BHC), in concentrations ranging from 0·025 to 0·6% for the ester preparation, 0·025 to 0·6% for Bladan, and 0·1 and 1·0% for the HCCH preparation. They were tested on galls of different wall thicknesses (ranging from 160μ to 18 mm.) of *Pemphigus filaginis* on leaves, and of *P. bursarius* on leaf stalks of *Populus*, of *Byrsocrypta ulmi* on leaves of *Ulmus campestris*, of *Pontania viminalis* and *P. vesicator* on leaves of *Salix*, and of *Biorrhiza pallida* on shoot tips, and of *Diplolepis quercus-folii* on leaves, of *Quercus*. The chemical was applied to the galls with a fine brush, care being taken to keep the liquid well away from the gall-opening. The ester preparation gave good results even with thick-walled galls; aphids and Tenthredinid larvae were affected in 6–18 hours and killed in 24 hours. Bladan and HCCH were less lethal and took a longer period to affect the 'insects'. A separate test showed that there was no passage of the chemical as a gas or liquid through the gall-opening. Wingless individuals and larvae of *Byrsocrypta ulmi* showed severe symptoms of poisoning when the galls were treated, unlike the winged individuals, which were only slightly if at all affected.

449. JANCKE, O. Beiträge zur innertherapeutischen Schädlingsbekämpfung III. **[Contribution on the use of systemics in pest control. III.]** *Z. PflKrankh.* 58 (5/6), 1951 (179–85). 6 refs. [G.] I.I.E.

Experiments were made on the control of insects on a large number of plant species by the application

of Pestox, which has an effective basis of bis-dimethylaminophosphoric anhydride, and 8160 and 8169, which have a similar chemical structure. In trial sprayings of twigs on the lower portions of Elm branches ca. 1 m. long, attacks by *Eriosoma lanuginosum* and *Tetraneura ulmi* on the upper portions were successfully controlled with Pestox III or 8169 and with 8169 respectively.

450. Ripper, W. E. **Systemic insecticides.** [Pest Control Ltd., Cambridge.] [1952]. pp. 56. 227 refs.

A paper read at the 3rd International Congress of Crop Protection, Paris, 1952. Reviews the literature and present state of knowledge.

Isoptera

See also Nos. 47–8, 204, 869–71.

451. Wysong, N. **Tree maintenance: termites as tree pests.** *Amer. Nurserym.* 98 (2), 1953 (84–88).

Notes on infestations and methods of chemical control.

452. Buchli, H. H. R. ***Antennopsis gallica*, a new parasite on termites.** *Trans. 9th int. Congr. Ent., Amsterdam 1951* 1, 1952 (519–24). [E.] I.I.E.

A colony of *Reticulitermes* sp. from La Rochelle, split up into small societies and kept in breeding tubes, was severely attacked by a new parasitic fungus, *A. gallica*; nearly all individuals, irrespective of caste, were attacked and finally died. Healthy colonies were infected by (1) introducing infected termites into a new colony, and keeping the colony for a few days in a refrigerator at 10° C. until the intruders were accepted; the spread of the fungus was, however, slow and uncertain; (2) introducing wood and building material from a severely attacked colony; and (3) by removing infected inhabitants from a breeding tube and putting the tube with the existing galleries and chambers into a healthy colony—this was the easiest and most certain method. The first and most seriously diseased castes are those which work and move least, and the old workers are the last to be infected. Small colonies of less than 400 generally die within 6–9 months after infection, but in large colonies, often with over 100,000 inhabitants, near La Rochelle the fungus was present without causing much damage. *Reticulitermes lucifugus* and *Calotermes flavicollis* when inoculated with the new disease showed similar development. The possibility of cultivating the fungus and using it in termite control is discussed.

Thysanoptera

453. Vité, J. P. Einige Grundlagen zur Bekämpfung des Lärchenblasenfusses. [**Basic considerations for the control of *Taeniothrips laricivorus*.**] *Holz-Zbl.* 79 (101), 1953 (1087–8). [G.]

Properly to appraise the need for, and kind of, control measures to be taken, one must determine the extent of the actual attack and of the damage done by attacks during the preceding years. The author analyses the attack on the apical shoot, branches, etc. Control measures seem called for only in plantations where considerable damage is observed. It should be taken into account that the absolute infestation of a shoot depends on its thickness and position; ca. 70% of the *T. laricivorus* population live in the upper third of the tree crown. Spruce (including Sitka) can be a host of *T. laricivorus* and shows a higher infestation from summer until early spring. Control on Larch should begin ca. 5–8 weeks after leaf flush.

Hemiptera

See also Nos. 45, 448–9.

454. Schmutterer, H. Die Zikade *Cicadella viridis* (L.) als Roterlenschädling. [***C. viridis* as a pest of Alder.**] *Forstwiss. Cbl.* 72 (7/8), 1953 (247–54). 13 refs. [G.g.]

In spring 1952, young *Alnus glutinosa* plantations in Weisingen showed numerous fissures in the stems, often accompanied by dead bark. Injury was so severe as to cause numerous deaths. Eggs discovered under the bark proved to be those of *C. viridis*, the life history and habits of which are detailed. Treatment with insecticides would not be economic, but attack may be avoided by planting only 3-year-old trees, with bark too tough for penetration. Cutting of grass and reeds around plantations should be avoided during September, the season of oviposition.

455. Nuorteva, P. Ein Massenauftreten von *Oncopsis tristis* Zett. (Hom., Macropsidae) auf Birken nebst Beobachtungen über die Biologie der Art. [**An outbreak of *O. tristis* on *Betula pubescens* with observations on the biology of the species.**] *Annales Entomologici Fennici, Helsinki* 17 (4), 1951 (162–6). 14 refs. [G.] L.S.

Observations on an outbreak in the Hattula district of Finland, including numbers of adults emerging throughout the summer, enemies, nutrition, honeydew secretion and damage to the trees—chiefly injured and swollen petioles. The Birches infested had previously been attacked by *Fomes nigricans*.

456. Kerr, T. W., Jr. **Control of Rhododendron whitefly, woolly Larch aphid, Rose scale and southern red mite.** *J. econ. Ent.* 46 (2), 1953 (353–5). 7 refs.

Presents the results of tests to find suitable control measures. (1) *Dialeurodes chittendeni:* DDT was slightly more effective than lindane or nicotine sulphate. (2) *Aulacaspis rosae:* Nicotine sulphate was more effective than DDT, but even with 3 applications only 83·7% control was obtained. (3) *Chermes strobilobius:* All the insecticides were effective, but dormant sprays of petroleum oil and petroleum oil + nicotine sulphate were more effective than lindane or nicotine sulphate applied as verdant sprays. (4) *Paratetranychus ilicis:* Both chloroethyl butylphenoxy methyl ethyl sulphite and *p*-chlorophenyl *p*-chlorobenzenesulphonate were effective in reducing mite populations when included with DDT in both of 2 applications. When they were included in the first spray only, the mite population increased. Foliage was injured by addition of the latter substance.

457. Balch, R. E. **Susceptibility of species of Fir to Balsam woolly aphid *Adelges piceae* (Ratz.).**

Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can. 9 (4), 1953 (1).

Observations made in Europe and in Canada indicate that most species of Fir are resistant to attack by this aphid, and that its greater destructiveness in Canada (where it was introduced from Europe) is due to the higher sensitivity of *Abies balsamea* and the allied *A. fraseri* to the salivary injections of the insect as well as to lack of natural control.

458. Franz, J. *Laricobius erichsoni* Rosenhauer (Col. Derodontidae), ein Räuber an Chermesiden. [***L. erichsoni*, a predator on woolly aphids.**] *Z. PflKrankh.* 60 (1), 1953 (2–14). 8 refs. [G.g.e.] [Commonwealth Institute of Biological Control, Ottawa.] E.M.B.

Discusses its distribution in Europe, development, biology, ecology, and the most important mortality factors and its use for biological control of *Adelges piceae* and *A. nordmannianae*.

459. Underwood, G. R. **Biennial cycle of injury by Pine leaf chermes.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 9 (3), 1953 (1).

Studies of *Pineus pinifoliae* in New Brunswick since 1946 reveal a biennial cycle of abundance and injury to White Pine. This is related to the pest's complex 2-year life cycle. A winged form (gallicola) goes from Red Spruce to White Pine one year and another winged form (sexupara) returns to the Spruce the following year. There are intermediate wingless forms. The greatest mortality observed has been to the dormant first-stage offspring of the gallicola on the new shoots of the Pine; mortality is often complete on heavily infested shoots, owing to the death of the shoot or competition for food.

460. Varty, I. W. **'*Cinaropsis pilicornis*': a rare aphid attacking Spruce transplants.** *Scot. For.* 7 (3), 1953 (86–7).

The insect is described and an account given of an outbreak on 2 + 2 Sitka Spruce transplants in Nevis nursery. Control was effected by spraying three times with an emulsion of paraffin and soft soap.

461. Bennett, F. D. **Biological control of insect pests. B. *Cryptochaetum iceryae* Will.—a dipterous parasite of *Icerya purchasi* Mask.** *Rep. Dep. Agric. Bermuda 1950*, [1951?] (24).

C. iceryae was released in 1950, has established itself in Bermuda, and should successfully supplement the control of *Icerya purchasi* exercised by *Rodolia cardinalis*.

462. Barter, G. W. **Additional observations on the Beech scale [in New Brunswick].** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 9 (3), 1953 (1–2).

It is suggested that the widespread reduction in *Cryptococcus fagi* in 1948 was due to conditions associated with low winter temperatures, and that decreases occurring on some plots and trees in 1943–4 and 1946–7 were due in part to the increased activity of a predaceous beetle *Chilocorus stigma*.

463. Dustan, A. G. **Bermuda's Cedars threatened while entomologists seek insect control chemicals.** *Agricultural Chemicals, Baltimore* 7 (5), 1952 (67–8, 113–5). O.R.E.

A brief summary of the history of attacks by *Lepidosaphes newsteadi* and *Carulaspis visci* on *Juniperus bermudiana* in Bermuda, and attempts at control. [Cf. *For. Abstr.* 13 (Nos. 3152–3).]

464. Bennett, F. D. **Biological control of insect pests. A. *Carulaspis* [*Diaspis*] *visci* on Cedars.** *Rep. Dep. Agric. Bermuda 1950*, [1951?] (19–23).

The coccinellid *Lindorus lophanthae*, introduced in 1947 to control the scale insect *Diaspis visci* on *Juniperus bermudiana*, established itself rapidly, but is not able alone to establish control. The ant *Pheidole megacephala* is probably an important factor in keeping down the numbers of *L. lophanthae* and it is possible that the latter could control the infestation if ants could be barred from Cedar trees. Notes are given on a number of other predators that have been introduced. [Cf. *For. Abstr.* 14 (No. 482).]

465. Graham, K., and Prebble, M. L. **Studies of the Lecanium scale, *Eulecanium coryli* (L.) and its parasite, *Blastothrix sericea* (Dalm.), in British Columbia.** *Repr.* from *Canad. Ent.* 85 (5), 1953 (153–81). 22 refs. (*Contr. Div. For. Biol. Dep. Agric. Can.* No. 54.)

Presents the results of a 1941–5 re-survey to discover the extent of parasitization of *Lecanium coryli* by *B. sericea*. Population data from representative sampling points indicate that parasitization, though often quite high, usually resulted in the death of only about half of the parasitized nymphs. Winter kill and underdevelopment of the nymphs were, in most cases, equal to, or more important than, parasitization in limiting populations. The rate of parasite increase from the time adults emerged from the *L. coryli* ♀s in June until they oviposited in the nymphs in the autumn was usually low, and in some cases there was a decrease. The long summer separation of *B. sericea* adults from the nymphal scales seemed to limit parasite effectiveness seriously.

Lepidoptera

See also Nos. 50–5, 250, 447.

466. Patočka, J. Žír housenek na dubech jižního Slovenska v době předletního náporu roku 1952. **[Damage to Oaks in southern Slovakia by lepidopterous larvae during the spring outbreak of 1952.]** *Lesn. Práce* 32 (4), 1953 (174–81). [Cz.]

Tabulates the incidence of larvae of 21 insect species on Oaks in 10 localities of S.W. Slovakia (mainly belonging to the *Querceto-Carpinetum*).

467. Kamp, H. J. Vermehrtes Auftreten des Blausiebs in Württemberg. **[Increased occurrence of *Zeuzera pyrina* in Württemberg.]** *Holz-Zbl.* 79 (5), 1953 (31). [G.]

This insect has been appearing in increasing numbers in many parts of Württemberg since 1950, mostly in Oak/Beech stands.

468. Thalenhorst, W. Zur Bekämpfung der Lärchenminiermotte. **[Control of *Coleophora***

***laricella*.]** *Holz-Zbl.* 79 (81), 1953 (893–4). 4 refs. [G.]

Some new synthetic insecticides appear to be promising for the control of *C. laricella*. They are: (1) stomach poisons such as E605 or Systox, used in late summer for poisoning the young larvae mining the conifer needles, and (2) poisoning of the older larvae in the spring, using a more durable coating of a DDT or mixed DDT/BHC preparation. Laboratory and field tests conducted in September 1952, and April, 1953, gave encouraging results.

469. GAUSS, R. Der Pappelwickler, *Epinotia aceriana* Dup. **[*E.* [*Gypsonoma*] *aceriana*.]** *Holz-Zbl.* 79 (56), 1953 (631). [G.]

Appeared in greater numbers in 1950 in S.W. Germany, attacking Poplars of all age classes, particularly in nurseries and young plantations.

470. WALTERS, J. ***Laspeyresia* sp. as a bark moth on Western White Pine.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 9 (3), 1953 (4).

Laspeyresia piperana is well known as a cone moth but has not previously been reported as a cambium miner.

471. ACATAY, A. Ein Zedernschädling: *Acalla undulana* Wisghm. **[*A. undulana*, a pest of *Cedrus libani* [in S. Anatolia].]** *Trans. 9th int. Congr. Ent., Amsterdam 1951* 1, 1952 (708–10). [G.] I.I.E.

Cf. *For. Abstr.* 14 (No. 3533).

472. **Deterioration of budworm-killed trees.** *Rep. Ntheast. For. Exp. Sta. 1951*, 1952 (33–4).

Analysis of data from 27 ¼-acre plots indicates that Balsam Fir must be salvaged within 2 years after death but that Black and White Spruce may be left up to 5 years. The proportion of Balsam Fir is the important factor in determining the maximum period of economic salvage. Approximate volume losses from decay for trees dead 1, 2, 3, 4, 5 or more years were 15, 47, 48, 85, and 95% respectively for Fir and 10, 20, 22, 25 and 75% for Black and White Spruce combined.

473. MILLER, C. A. **Parasitism of Spruce budworm eggs by *Trichogramma minutum* Riley.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 9 (4), 1953 (1).

474. ARTHUR, A. P., and COPPEL, H. C. **Studies on dipterous parasites of the Spruce budworm, *Choristoneura fumiferana* (Clem.) (Lepidoptera Tortricidae). I. *Sarcophaga aldrichi* Park. (Diptera: Sarcophagidae).** *Canad. J. Zool.* 31 (4), 1953 (374–91 + 3 photos). 29 refs. (*Contr. Div. Ent. Dep. Agric. Can.* No. 3080.) O.R.S.

Discusses the hosts and distribution in N. America of *S. aldrichi* and describes its development and methods of rearing *S. aldrichi* and *C. fumiferana* in the laboratory.

475. MAW, M. G., and COPPEL, H. C. **Studies on dipterous parasites of the Spruce budworm, *Choristoneura fumiferana* (Clem.) (Lepidoptera: Tortricidae). II *Phryxe pecosensis* (Tns.) (Diptera: Tachinidae).** *Canad. J. Zool.* 31 (4), 1953 (392–403). 9 refs. (*Contr. Div. Ent. Dep. Agric. Can.* No. 3081). O.R.S.

Describes its stages of development, life history and habits.

476. WALLEY, G. S. **Hymenopterous parasites of *Choristoneura pinus* Free. (Lepidoptera: Tortricidae) in Canada.** *Repr.* from *Canad. Ent.* 85 (4), 1953 (152). (*Contr. Div. Ent. Dep. Agric. Can.* No. 3007.)

A list of 13 species, 9 of which are also recorded as parasites of *C. fumiferana*.

477. MILOSAVLJEVIĆ, R. Hrastov savijač (*Tortrix viridana* L.) je u gradaciji. **[Mass outbreak of *T. viridana* [in Jugoslavia].]** *Šumarstvo* 6 (1), 1953 (33–5). 5 refs. [Serb.serb.]

T. viridana has been epidemic in the Oak forests of Serbia and Croatia for the last few years. Results of spraying 16·5% DDT solution from aircraft, in April 1952, were not satisfactory. The use of helicopters and better timing of spraying are advocated.

478. PRENTICE, R. M. **Egg parasitism of forest tent caterpillar [*Malacosoma disstria*].** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 9 (4), 1953 (2–3). 2 refs.

In 1952 there was a marked increase in parasitization of the eggs of this species, most of the increase being due to the chalcid fly *Telenomus clisiocampae*. The number of eggs parasitized appears to be related to the amount of protective covering or 'spumaline', present on the eggs [cf. *For. Abstr.* 8 (No. 2769)].

479. JAMNICKÝ, J. Premnoženie piad'ovky *Colotois pennaria* L. na východnom Slovensku. **[Outbreak of *C. pennaria* in E. Slovakia.]** *Pol'ana* 9 (5), 1953 (109–10). [Slovak.]

Ca. 90 ha. of mixed broadleaved stands (mostly Oak, Beech, and Hornbeam), 10–50 years old, near Jasov (E. Slovakia) were attacked in 1950–1 by *Colotois* (*Himera*) *pennaria*.

480. VEER, E. J. VAN ALPHEN DE, and GOVERS, A. **Reactions of *Pinus merkusii* on defoliation.** *Commun. For. Res. Inst., Bogor* No. 38, 1953. pp. 4 + 7 photos. 6 refs. [E.] (*Repr.* from *Tectona* 42, 1952 (151–4).)

Describes the effect of a heavy attack by a geometrid, *Milionia basalis*, on plantations of *Pinus merkusii* in the Toba highlands of North Sumatra. Pines of Tapanuli origin (S. of Lake Toba) died as a result of defoliation by this insect; Pines of Atjeh origin (120 miles N. of Lake Toba) survived. Notes are also given on secondary pests It is concluded that the Tapanuli race, in spite of its better form, greater yield of resin, and higher resistance to shoot and stem borers, should not be planted until some method of controlling *M. basalis* has been devised.

481. ARBATSKAJA, H. Přastevník americký a ochrana proti němu. **[The fall webworm (*Hyphantria cunea*) and control measures against it.]** *Lesn. Knihovna* (*malá Řada*) No. 22, 1953. pp. 39. [Cz.] Price *Kčs.* 15.

Describes the biology of, and damage done by *H. cunea*, and its spread in Europe since 1940, in particular in Slovakia, where it was reported

officially in 1948. Mechanical, chemical, and biological methods of control in Slovakia are described in some detail. The main insecticide used is DDT, in the form of solution, paste, or emulsion. [Cf. *For. Abstr.* 14 (Nos. 1358, 2461).]

482. Brown, C. E., and Lindquist, O. H. **The spotless fall webworm**. *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 9 (4), 1953 (2).

Data are given on parasitization of *Hyphantria textor* in the Prairie Provinces of Canada. The following hymenopterous parasites have been identified: *Hyposoter pilulosus*, *Apanteles hyphantriae*, *Meteorus bakeri*, and *Therion sassacus*.

483. ***Lymantria dispar* (L.) (Gipsy moth)**. *Distr. Maps Insect Pests* (*Ser. A*) No. 26, 1953. pp. [2]. [Commonwealth Institute of Entomology, London.]

484. Howard, J. O. **Portugal aids the United States in fighting the gypsy moth**. *Foreign Agric.* 17 (4), 1953 (81–3). E.M.B.

[Cf. *For. Abstr.* 14 (No. 3548).] Describes the work of collecting sex attractant from *Lymantria dispar* in Portugal for use in the U.S. control programme.

485. Ceballos, G., and Zarco, E. Sobre el desarrollo y combate en España de la *Liparis monacha*, en masas de *Pinus silvestris* de las cordilleras de la meseta central. [**The development and control of *L. monacha* in *P. sylvestris* stands of the mountain ranges of the central Spanish highlands.**] *Trans. 9th int. Congr. Ent., Amsterdam 1951* 1, 1952 (705–7). [Span.e.] I.I.E.

A report on control operations by dusting from the air with emulsions and powders of BHC and DDT. 80% of the larvae were killed.

486. Thielmann, K. Giftnebel zur Schädlingsbekämpfung: Einsatz von Nebelgeräten zur Bekämpfung der Nonne im Forstamt Weiden. [**Toxic fog in insect control: the use of fog machines against nun moth in the Weiden forest district.**] *Holz-Zbl.* 76 (109), 1950 (1187–8). [G.]

DDT in paraffin solution applied with a Lister-Todd fogging machine gave 98–100% control of caterpillars in May–June 1950, 2 to 3 days after application. The DDT was applied at a rate of 0·8–1 kg./ha.

487. Biliotti, E. Difficultés rencontrées dans la détermination des périodes d'intervention contre les processionaires du chêne et du pin. [**Difficulties in deciding the period at which to apply control measures against *Thaumetopoea processionea* and *T. pityocampa*.**] *Rev. Path. vég.* 31 (2), 1952 (115–20). 19 refs. [F.] I.M.I.

Investigations have shown that the 1st and 2nd larval stages are those at which the insect is most susceptible to treatment with insecticides. In 1951 at Chevrières (Oise) hatching of *T. processionea* took place from 15 to 20 April and the transition to the 3rd larval stage about 16 May. At Lunel (Hérault) *T. pityocampa* hatched between 5 and 26 September and the earliest transition from the 2nd to the 3rd stage took place on 28 September. Tachinid parasites emerged from 16 May and 27 September respectively. A list of parasites found dead after the treatment of the two species on 7 May and 20 September respectively is given and illustrates the danger of a reduction in the parasite population as a result of mistimed insecticidal treatment.

488. Lepori, L. Una micosi delle larve di *Thaumetopoea pityocampa* Schiff. [**A fungus disease of the larvae of *T. pityocampa*.**] *Notiz. Malatt. Piante* No. 19, 1952 (77–9, 90). 5 refs. [It.it.e.] I.M.I.

Two fungi, *Beauveria globulifera* and *Oospora guerciana* were isolated from larvae of *T. pityocampa*. *B. globulifera* was proved to be pathogenic to the larvae.

Coleoptera

See also Nos. 61, 321.

489. Francke-Grosmann, H. Über Larvenentwicklung und Generationsverhältnisse bei *Hylecoetus dermestoides* L. (Coleoptera, Lymexylidae). [**Larval development and relationship of generations in *H. dermestoides*.**] *Trans. 9th int. Congr. Ent., Amsterdam 1951* 1, 1952 (735–41). 7 refs. [G.] I.I.E.

Figures showing the lengths of ♂ and ♀ larvae, and the proportion of larvae in different stages of development from late April to early June are given in graphs, and the different stages of larval development are described. Development in conifers may be more rapid than in hardwoods; in June 1951, 75% of beetles from eggs laid in the spring of 1950 in Douglas Fir stumps had emerged while examples from Beech and Oak showed that only 25% had emerged after 1 year.

490. Gauss, R. Zwei oft verkannte Nadelholzschädlinge: Schwarzkäfer (*Serropalpus barbatus* Schall.) und Rothalsbock (*Leptura rubra* L.). [**Two often underestimated conifer pests: *S. barbatus* and *L. rubra*.**] *Holz-Zbl.* 79 (65), 1953 (735). [G.]

A brief description of the insects, their biology, damage done by them, and control methods.

491. Dominik, J. Głaszczyn—mało znany szkodnik drewna jodłowego i świerkowego w Beskidzie Sądeckim. [***Serropalpus barbatus*, a little known pest of Firwood and Sprucewood in the Beskids near Sącz.**] *Sylwan* 97 (2), 1953 (92–5). [Pol.]

Summarizes the results of the author's observations on *S. barbatus* in the Beskids since 1947. Swarming occurs in that region in July–September when imagos, pupae and larvae can be found in the wood. Imagos leave the forest preferably at night and only in fine weather. They shun light; their flight resembles that of *Melolontha* sp. Their eggs are white, oval, ca. 1·2 × 0·2 mm. They attack freshly felled or wind-thrown Fir and Spruce and usually stay in a stem for several generations until the wood is completely destroyed. Branches thicker than 4 cm. are also attacked. No attack has been observed on standing trees. Only the younger larval instars bore along the growth rings, the older ones boring in various directions through the rings. The tunnels reach to a depth of 2·5–5·5 cm., and are indistinguishable from those of *Sirex* spp. The pupal chamber is merely the end of a tunnel, free

from frass. Its distance from the wood surface depends on the degree of fungal decay, i.e. it is less in sound, and greater in decayed wood. The diameter of the exit holes varies from 2 to 5 mm. Pupation begins in June, the quiescence lasting 12–24 days; the young beetle remains in the chamber for another 5–6 days. Emergence takes 6–10 days. When bred in the laboratory, imagos live without food for up to 21 days, remaining active and ready for copulation. There is probably one generation in two years. Natural enemies of *S. barbatus* are the larvae of *Rhyssa persuasoria*, and, probably, of *Pyrochroa coccinea* and *Erinna* (*Xylophagus*) spp.

492. Bytinski-Salz, H., and Neumark, S. **The Eucalyptus borer (*Phoracantha semipunctata* F.) in Israel.** *Trans. 9th int. Congr. Ent., Amsterdam 1951* 1, 1952 (696–9). [E.] I.I.E.

Cf. *For. Abstr.* 14 (No. 3552).

493. Schread, J. C. **Control of the strawberry root weevil [*Brachyrhinus ovatus*] and black vine weevil [*B. sulcatus*] in [conifer] nursery planting.** *Circ. Conn. agric. Exp. Sta.* No. 174 (rev.) 1951. pp. 8.

Control of both weevils can be effected by treating the soil with 50 lb. chlordane (5% dust) mixed with 75 lb. fertilizer, or 17 lb. BHC (6% γ-isomer) mixed with 100 lb. fertilizer, per $\frac{1}{4}$-acre. [Cf. *For. Abstr.* 15 (No. 231).]

494. Wellenstein, G. Die Borkenkäferkalamität im Mitteleuropa. **[The barkbeetle outbreak in central Europe.]** *Trans. 9th int. Congr. Ent., Amsterdam 1951* 1, 1952 (688–93). [G.] I.I.E.

Reviews briefly the extent of damage since about 1940 and some control measures.

495. Thalenhorst, W. Die Borkenkäfer-Katastrophe in Deutschland. Übersicht über das neuere Schrifttum. 2. Nachtrag. **[The barkbeetle outbreak in Germany. A review of recent literature, supplement 2.]** *Z. PflKrankh.* 60 (1), 1953 (15–9). 71 refs. [G.] E.M.B.

A review of literature to November 1952. [Cf. *For. Abstr.* 11 (No. 3329).]

496. Novák, V., and Martínek, V. Zimování kůrovce. **[Hibernation of barkbeetles.]** *Lesn. Práce* 32 (1), 1953 (28–33). [Cz.]

The authors found barkbeetles in soil samples collected in winter 1951 and early spring of 1952 in 2 places in Bohemia. Many were found in dry bark remnants on the litter, and great numbers in the litter near roots of attacked trees or of stumps. The insects were found in all development stages from larvae to imagos. In stumps, the infestation decreases from the cut surface to the roots. A favourite place for barkbeetles is the thin layer of cambial tissue left on badly barked stems.

497. Kinghorn, J. M. **Chemical control of bark beetles.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 9 (4), 1953 (4).

Earlier work [cf. *For. Abstr.* 13 (No. 4048)] indicated that DDT 25% emulsion concentrate produced a higher % control of *Dendroctonus monticolae* broods beneath the bark of Lodgepole Pine logs than other tried insecticides, but the kill was neither rapid enough nor high enough to be considered adequate for reducing brood potential. During 1952 heavier dosages of all insecticides were used in tests of 11 insecticides on 2½-ft. infested log sections, a standard rate of 0·8 lb. of active ingredient being added to each imperial gallon of 20% oil in water emulsion. Aldrin, dieldrin, heptachlor, $C_2H_4Br_2$, and lindane quickly killed 90%, and sometimes 100% of the broods. Technical-grade DDT dissolved in Velsicol AR showed little power of penetrating the bark, so that early mortality was low. Later, however, the DDT was effective in killing over 90% of the beetles as they began to emerge.

498. Brown, G. S. **The mountain Pine bark beetle outbreak at Windermere Creek [, B.C.].** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 9 (4), 1953 (3).

A study of the incidence of *Dendroctonus monticolae* attack on Lodgepole Pine was made on more than 2000 trees on 30 plots of $\frac{1}{6}$ acre each. No correlation was found between % of trees attacked and stand composition, stand density, age, or periodic increment. There was a direct correlation between % of trees attacked and volume/acre and also a correlation of attack with diameter and crown class, the larger, more dominant trees having suffered most severely.

499. Becker, G. Die *Dendroctonus*-Kalamität in Guatemala. **[The outbreaks of *Dendroctonus* spp. in Guatemala.]** *Trans. 9th int. Congr. Ent., Amsterdam 1951* 1, 1952 (682–7). [G.] I.I.E.

The present centre of the attack is in the Cordillera mountains in the form of disconnected outbreaks varying in size. The species concerned in the primary attacks are *D. adjunctus* (the most serious), *D. mexicanus* and *D. parallelocollis*. Their altitudinal range is from 2000 m., with mass outbreaks occurring between 2500 and 3500 m. *Pinus rudis* is regularly, and *P. pseudostrobus* occasionally, killed. Outbreaks appear to develop slowly and to decline of themselves.

500. Bombosch, S. Über Änderungen der physiologischen Leistungen von *Ips typographus* L. bei einer ungestört ablaufenden Massenvermehrung. **[Changes in the physiological performance of *I. typographus* in an undisturbed, declining mass outbreak.]** *Trans. 9th int. Congr. Ent., Amsterdam 1951* 1, 1952 (675–8). [G.] I.I.E.

An investigation was made in 1946–7 in an area of the Black Forest in which a mass outbreak had begun in 1944 and was beginning to decline. Trees examined were either distributed throughout the area of attack or in a transect line passing through the area. The egg mortality was calculated as the difference between the number of egg tunnels and number of larval galleries to each mother gallery. Egg mortality for the 1st generation in the standing tree ranged from 11·5 to 13·9%, for the 2nd generation from 18·8 to 24·4 and for the 3rd generation was 31·3%. Further investigations showed that these differences were independent of such factors as parasitization of the parent beetles, locality, weather and population density. In the 2nd generation of the standing tree, with the same number of mother galleries to a given area 40% more eggs were laid per mother gallery than in 3rd generation. Higher

mortality from starvation was found in the 3rd than in the 1st.

501. GROSCHKE, F. Der 'schwarze Nutzholzborkenkäfer', eine neue Gefahr für Forstwirtschaft, Obst- und Weinbau. [***Xylosandrus germanus*, a new danger to forests, orchards and vineyards.**] *Anz. Schädlingsk.* 26 (6), 1953 (81–4). [G.]

Xylosandrus germanus was found in the late summer of 1952 in the Arheilger Wald near Darmstadt. This is the first record of the pest in the open in Europe. A description of the insect is given, showing points of difference with *Xyleborus dispar* and *Xyleborinus saxeseni*.

502. TOMAŠEVSKI [, S.] *Xyloterus lineatus* napada bukvu. [***X. lineatus* attacks Beech.**] *Šum. List* 77 (3), 1953 (145–7). [Croat.croat.]

The author's own observations show that *X. lineatus* attacks not only conifers but also Beech, either standing diseased trees or dry logs.

503. NITTO, M., and TACHIBANA, K. **On the effect of a fumigant (D.D.) and repellents (naphthalene and paradichlorobenzene) for white grub damage in Nagasaka nursery.** *Sorin, Akita Regional Forestry Office* No. 28, 1951. From *abstr.* in *Rec. Res. Fac. Agric. Univ. Tokyo* No. 2, 1951/52 (1953), (54). [E.]

Results obtained from experiments in 1951 were statistically analysed and the following conclusions were drawn: (1) When D.D. is injected in holes arranged in the 'Chidori' method, 1·8 c.c./hole is satisfactory for practical purposes although 3·6 c.c. D.D. is needed to kill the insects completely; (2) Saplings increased in both weight and height when 1.8 c.c. D.D. was used; (3) There is no confirmation of the repellent effect of D.D.; (4) The repellent effect of naphthalene and paradichlorobenzene dusted on the ground at the rate of 20 g./sq. m. and at intervals of 5–10 days was found to depend on the frequency rather than the heaviness of the application; (5) No damage by the repellents was caused to seedlings of *Cryptomeria japonica*.

Hymenoptera

See also No. 448.

504. RAWLINGS, G. B. **Progress in establishment of *Ibalia leucospoides*, a parasite of *Sirex noctilio*, the horntail borer of Pine.** *New Zealand Science Review, Wellington* 10 (7), 1952 (107–8). N.C.L.

Cf. *For. Abstr.* 13 (No. 1399).

505. GILBERT, J. M., and MILLER, L. W. **An outbreak of *Sirex noctilio* F. in Tasmania.** *Aust. For.* 16 (2), 1952 (61–9 + 2 plates). 12 refs.

S. noctilio, which has been established for some time in New Zealand, has now been found in a plantation of *Pinus radiata* in Tasmania. Although an unidentified fungus has been found in association with it in Tasmania, the rapid and extensive wood rotting reported from New Zealand has not been observed. [Cf. *For. Abstr.* 15 (Nos. 867–8).]

506. DOWDEN, P. B., and GIRTH, H. B. **Use of a virus disease to control European Pine sawfly.** *J. econ. Ent.* 46 (3), 1953 (525–6). 1 ref.

[Cf. *For. Abstr.* 12 (No. 2436).] A stock suspension of the virus successfully used against *Neodiprion sertifer* in Canada in 1949 was tested in New Jersey in 1951. The stock solution, diluted to approximately 250 million polyhedra per U.S. gal. was applied with a knapsack sprayer over a small area, and gave complete control. In 1952 air sprays of a suspension about 10 times the concentration used for ground sprays gave excellent control of a 18·6-acre block, also in New Jersey. Ground sprays, using a concentration of ca. 2 billion polyhedra per U.S. gal. also proved successful in Illinois in 1952.

507. HAŠEK, J. Žír pilatky horské, *Pachynematus montanus* Zadd., na smrku v oblasti SLH Frenštát p. Rad. (Beskydy) v roce 1952. [**Outbreak of *P. montanus* on Spruce in the region of Frenštát (Beskid mountains) in 1952.**] *Lesn. Práce* 32 (4), 1953 (159–64). [Cz.]

The damage by *P. montanus* in the Spruce stands near Frenštát was less intense in 1952 than in 1950 and 1951. This is said to be due to the combined effect of insecticidal treatment in 1951, increased parasitization, and very unfavourable climatic conditions during both swarming and feeding. It is concluded that chemical control (dusting the swarming imagos with contact insecticides) is very efficacious and that, given favourable conditions, the parasites (ichneumons and mycoses) can prevent large-scale outbreaks.

508. BROWN, C. E. **Control of the Balsam-Fir sawfly [*Neodiprion abietis*] in the agricultural areas of the Prairie Provinces.** *Forest Biology Processed Publications, Department of Agriculture, Canada* No. 2, 1953. pp. 3.

509. **Proceedings of a conference on the economic aspects of current Larch sawfly injury to Tamarack. [*Larix laricina*].** *Circular, Minnesota Department of Agriculture, Dairy and Food, St. Paul, Minn.* No. 204, 1952. pp. 40.

Includes the following papers, in addition to general and introductory ones: National forest Tamarack holdings in Minnesota (*A. W. Sump*); Comparison of the supply of Tamarack with other Lake States species (*A. G. Horn*); Tamarack on state land—stand quality and market value (*E. J. Adams*); Consumption and utilization of Tamarack by forest industries of the Lake States (*A. G. Horn*); Current consumption and utilization of Tamarack for pulpwood (*F. T. Fredrickson*); The biology of Tamarack and its management (*D. F. Duncan*); The chemical utilization of Tamarack (*R. L. Hossfield*); Appraisal surveys and aerial spraying (*J. W. Butcher*); Problems involved in cooperative spraying agreements (*C. B. Eaton*); Biological and cultural practices for control of the Larch sawfly (*R. R. LeJeune*).

510. BUTCHER, J. W. **Preliminary field evaluations of endrin and dieldrin for control of the Larch sawfly.** *Minn. For. Notes* No. 17, 1953. pp. 2. 1 ref.

Aerial spraying in July 1952 at a rate of 0·1 lb. actual endrin or dieldrin in 1·5 gal. fuel oil per acre gave results sufficiently promising to warrant further trials.

511. TURNOCK, W. J. **Some new predators of the Larch sawfly.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 9 (3), 1953 (2).

Several hitherto unrecorded predators of *Pristiphora erichsonii* have been observed. Four species of mirid bugs (*Phytocoris neglectus*, *Deraeocoris laricicola*, *Plaziognathus repeticus* and *Tetraphleps* sp.) were found on eggs and newly hatched larvae; an orb spider, *Neoscona arabesca*, fed on young larvae; and a small pink mite, *Balaustium* sp. preyed upon first- and second-instar larvae.

512. HEIMPEL, A. M. **Unusual predation of the Larch sawfly.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 9 (4), 1953 (2).

The swamp sparrow, *Melospiza georgiana*, usually a seed-eater, has been observed decapitating larvae of *Pristiphora erichsonii*, eating the heads and discarding the bodies. Other bird predators eat the whole larva.

513. MULDREW, J. **Population studies on *Bessa harveyi*.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 9 (3), 1953 (2–3).

Preliminary studies on *B. harveyi*, a parasite of the Larch sawfly (*Pristiphora erichsonii*), suggest that this parasite is poorly synchronized with its host. [Cf. *For. Abstr.* 10 (No. 1451).]

514. MULDREW, J. A. **The natural immunity of the Larch sawfly (*Pristiphora erichsonii* (*Htg.*)) to the introduced parasite *Mesoleius tenthredinis* Morley, in Manitoba and Saskatchewan.** *Canad. J. Zool.* 31 (4), 1953 (313–32). 34 refs. (*Contr. Div. For. Biol. Dep. Agric. Can.* No. 89.) O.R.S.

In a collection of 53 parasitized Larch sawfly larvae from British Columbia, the parasite developed normally in 51 hosts and there was no encapsulation. In host material from Manitoba and Saskatchewan, however, few of the parasites developed normally and a large % of eggs of *M. tenthredinis* were encapsulated. No relation was found between the sawfly larval stage attacked or the season of attack and effective parasitization. The % of eggs encapsulated by phagocytes increased with time spent in the host to almost 100% after 10 days, the viability in Ringer's solution of encapsulated eggs decreased with the time in the host, and the time of hatching increased with time spent in the host over 18 days. Eggs removed from their capsules developed and hatched more rapidly in Ringer's solution than encapsulated eggs but less rapidly than unencapsulated eggs. A larger number of *M. tenthredinis* larvae hatched and fewer eggs were encapsulated in unhealthy than in healthy host larvae. Higher summer temperatures appeared to result in a higher hatch of *M. tenthredinis* eggs. More of the embryos enveloped in white capsules at dissection proved viable than those in brown capsules. Sawfly larvae from both Manitoba and British Columbia deposited capsules about thorn tips introduced into their bodies, the thinnest capsules being found on thorns from larvae with the highest concentration of haemocytes. It is concluded that the phagocytes of the Larch sawfly in Manitoba and Saskatchewan are important in the immunity of this insect to *M. tenthredinis*.

515. HERON, R. J. **Substitute shoot production by Tamarack [after destruction of terminal shoots by the Larch sawfly.]** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 9 (3), 1953 (2).

Trees that had been severely defoliated for 5–6 years in succession were observed to have produced large numbers of shoots from lateral buds that would normally produce fascicles of needles. In many cases epicormics were observed growing from the main stem and larger branches.

516. FUKUDA, N., and OKUSHIRO, S. **Effectiveness of E-605f against chestnut gall wasp.** *Nogyo Oyobi Engei* (*Agr. and Hort.*) 28, 1953 (415–6). [Jap.?] From *Chem. Abstr.* 47 (13), 1953 (6594*h–i*). P.R.

E-605f emulsion, sprayed in dilutions of 100–2,000, in April on Chestnut trees damaged by the galls of *Dryocosmus* sp., caused about 50% and 100% mortality after 2 months and 5 months, respectively.

Diptera

See also No. 755.

517. NIJVELDT, W. Galmuggen van cultuurgewassen. III. Galmuggen schadelijk voor de boomteelt in Nederland. **[Gall midges of crops. III. Gall midges damaging trees in the Netherlands.]** *Tijdschr. PlZiekt.* 59 (4), 1953 (137–42). 1 ref. [Du.e.] E.M.B.

Discusses the damage caused by and the characteristics and development of: *Dasyneura crataegi* and *D. marginemtorquens* on *Crataegus oxyacantha* and *Salix viminalis* respectively; *Monarthropalpus buxi* on *Buxus sempervirens*; and *Rhabdophaga rosaria* and *R. terminalis* on *Salix alba*.

518. ODA, K., and IWASAKI, A. **[Studies on the Pine gall midge, *Cecidomyia brachyntera* Schwage. I. Life history in the Kumamoto district.]** *Bull. For. exp. Sta., Meguro, Tokyo* No. 59, 1953 (67–84). [Jap.e.]

Discusses the distribution in the Kyushu district of *C. brachyntera* on *Pinus densiflora* and *P. thunbergii* and describes a study in field and laboratory of the stages of its development between October 1950 and July 1951. [Graphs, photographs and drawings have English legends.] *From authors' summary.*

459. *Other Animals*

See No. 456.

46. DAMAGE TO TREE GROWTH BY MAN

See Nos. 166, 187.

48. INJURIES DUE TO UNKNOWN OR COMPLEX CAUSES

519. **Dieback of Birch.** *Rep. Ntheast. For. Exp. Sta. 1951*, 1952 (32–3).

None of 6 fungi isolated from twigs of Yellow and Paper Birch in different states of decay was virulently pathogenic when inoculated into vigorous saplings but a *Phomopsis* sp. was moderately pathogenic on weakened tissue. *Phytophthora cinnamomi* was not found in the upper 10 in. of soil in nurseries in Maine nor in root tissue. An unknown organism, possibly *Cylindrocarpon* sp. was most frequently isolated from roots, with another unknown fungus

not secured in pure culture. No evidence of parasitism was observed.

520. Day, W. R. **Beech bark necrosis.** *Rep. imp. For. Inst., Oxf. 1951/52*, 1953 (13–4).

Observation of the dying of Beech bark round necrotic areas has now been carried on sufficiently long to show that this is a seasonal phenomenon in the area under observation (Bagley Wood, Oxford). There is a completely dormant period which begins about the end of October and continues until late winter (probably usually some time in February). Freshly dead areas may then be observed; they gradually become reduced in abundance and disappear about the end of June, and a dormant summer period then ensues, which ends some time in September. Specimens examined from this area show that the initial and most severe dying of bark took place at the end of the winter of 1947—one of the most severe winters on record. This, together with similar observations recorded on the continent of Europe, seems to make it plain that severe late winter frost at least acts as an initiating factor in this disease. There are indications, from other material, that severe drought may also act as an initiating factor.

5. FOREST MENSURATION. INCREMENT; DEVELOPMENT AND STRUCTURE OF STANDS. SURVEYING AND MAPPING

See also No. 2.

521. Radwański, B. Działalność Zakładu Dendrometrii IBL w okresie 1.X.1949–1952. **[Activity of the Mensuration Section of the Polish Forest Research Institute from 1.10.1949 until 1952.]** *Sylwan* 97 (1), 1953 (54–8). [Pol.]

The work done includes: dimensional assortment tables for Pine (to be published soon), and research on the accuracy of the determination of c.a.i.

52. MEASUREMENTS OF STEM DIMENSIONS AND VOLUME OF TREES, STANDS, FORESTS AND TIMBER

522. Korsuň, F. D. Vzájemný vztah taxačních veličin stromů sosny obecné. **[Mutual relationships between the mensurational factors of *Pinus sylvestris* stems.]** *Práce výzkum. Úst. lesn. ČSR* No. 2, 1953 (87–110). [Cz.cz.russ.e.]

Presents tabulated and graphed results of measurements of 49 Pine stems aged 46–200, felled near Puławy (Poland), and on their stumps and roots, which were dug out after felling. The equation

$$V = \frac{t^2}{A + Bt + Ct^2}$$

represents the relationship found between the total stem height V and age t; the equation

$$D = \frac{r}{A + Br}$$

represents the relationship between the d.b.h. D, and $r = t^{-10}$; the equation $S = At^{(b + c \log t)}$ represents the relationship between the [total?] stem volume S and the age t; the relationships between age and other factors (volume u.b. of stem, % volume of branches, bark and roots, area of crown projection, and the 'form number' T) are linear. The various relationships between V, D, and S are: $V = 1{\cdot}3 + \frac{D}{a + bD}$, $S = KD^n$, and $S = KV^n$; and those of crown projection P, with D and T: $P = KD^n$, and $P = KT^n$. In all these equations, A, B, C, a, b, c, K, and n are constants. The relationships between the % volume of branches, bark and roots, and the age, diameter, form number, and height are also analysed. The paper ends with correlations found between the Kraft classes or site quality classes, and the mensurational factors of Pine stems.

521. *Diameter (Girth) and Sectional Area*

523. McCormack, J. F. **D.B.H. in relation to stump diameters at various heights for Southern Yellow Pines and hardwoods.** *Res. Note Stheast. For. Exp. Sta.* No. 43, 1953. pp. 2.

Tabulates figures obtained from Forest Survey sample plots in Georgia and N. Carolina showing tree diameter at breast height for stumps with diameters 6–30 in. at 6, 12, 18, and 30 in. above the ground. [Cf. *For. Abstr.* 14 (No. 3584).]

524. Zimmerle, H. Durchmesserermittlung in 5 m Höhe bei stehendem Holz der Rotbuche. **[Determination of the diameter at a height of 5 m. in standing Beech trees.]** *Holz-Zbl.* 76 (107; 108), 1950 (1162–3; 1179–80, 1182). 6 refs. [G.]

Tabulates and discusses the results of supplementary measurements conducted since 1928–9 to complete the findings published in the author's paper under the same title in *Forstliche Wochenschrift Silva, Tübingen* 24 (6–10), 1936 (41–6; 49–55; 57–62; 65–70; 73–5).

525. Vanselow, K. Einfluss der Abrundung bei der Durchmesser-Ermittlung des Stammholzes auf den Festgehalt. **[The influence of rounding off in log-diameter measurement upon estimations of cubic content.]** *Forstwiss. Cbl.* 72 (5/6), 1953 (137–44). [G.]

Compares the errors encountered in measuring log diameters by the methods of Busse, Tischendorf, and Krippel, and their deviation from the 'true values' (i.e. the arithmetical mean of a double measurement in mm.), gives a table showing % error in b.a. computations arising out of various degrees of error in stem diameter measurements, and presents comparative figures for cubic-content measurements based on 'true values' and on measurements made by the methods of Busse, Krippel and Tischendorf in timber from Beech, Pine, and Spruce stands. The method of Busse gives results closest to the 'true values'. [Cf. *For. Abstr.* 14 (No. 3583).]

526. Cromer, D. A. N. **Basal area per acre.** *Aust. For.* 16 (2), 1952 (57–61 + photo). 6 refs.

A description of Bitterlich's 'Winkelzahl' method of measuring basal area with the Relascope.

522. *Height, Length*

527. Zach, L. W. **Measuring log lengths.** *Tech. Note Alaska For. Res. Cent.* No. 12, 1951 (1).

Comparison of lengths obtained with a wheel giving 4 ft. per rev., a bamboo pole, and a steel tape, on 45 Spruce and Hemlock logs in a flat raft, showed that the wheel gives very accurate results and needs no more time than the pole, but in its present form it is difficult to count the revolutions. A tallying device is being considered.

528. Stoffels, A., and Soest, J. van. Principiële vraagstukken bij proefperken. 3. Hoogteregressie (1). **[The main problems in sample plots. 3. Height regression (1).]** *Ned. Boschb.-Tijdschr.* 25 (7/8), 1953 (190–9). 7 refs. [Du.du.e.] (*Korte Meded. Bosbouwproefsta. T.N.O., Wageningen* No. 18.)

[Cf. *For. Abstr.* 13 (No. 518).] An examination was made, using data from 5 sample plots of Japanese Larch (ages 12–47 years) with a total of some 5,000 trees, and one of Douglas Fir (age 41 years) with 74 trees, of the accuracy of different formulae expressing the height curve (h/d) as a straight line. The test applied was comparison of the stand volume calculated by diam. classes from the smoothed formula heights, with the true stand volume calculated from the measured height of each individual tree. A similar comparison was made using heights read off from an ordinary free-hand height curve based on the same data. Results show that volumes from the formulae differ only slightly from those obtained by measurement. Gehrhardt's formula, $h = a\frac{1}{d^2} + b$ where a and b are constants, is less accurate if applied to young stands. The formulas of Näslund, $h = 1{\cdot}3 + \frac{d^2}{(a + bd)^2}$ and Stoffels, $h = bd^a$ [cf. *For. Abstr.* 13 (No. 2319)] give results rather below the measured volumes. Henriksen's formula, $h = a \log d + b$, gives excellent results and is recommended for research and practice. The results of the measurements are given in graphs and tables with English legends.

523. *Bark*

529. Minor, C. O. **Loblolly Pine bark thickness.** *LSU For. Notes La. agric. Exp. Sta.* No. 1, 1953. pp. 2.

Linear regressions based on > 2000 stems have been developed for (1) single bark thickness at breast height and (2) d.b.h. inside bark, based on tree d.b.h. over bark and average stand age.

524. *Determination of the Volume of Trees and Stands*

524.1. Principles of Volume Determination. Form (Taper)

530. Roupec, J., and Kopřiva, E. Příspěvek k odhadu hmoty habrových větví. **[Determination of the volume of Hornbeam branchwood.]** *Lesn. Práce* 31 (10), 1952 (463–5). [Cz.]

The equation obtained from measurements on 434 stems of *Carpinus betulus* in Czechoslovakia is $H = 8{\cdot}540\ (\log d)^{6{\cdot}65416}$ where H is the volume of branches in cu. dm. and d the d.b.h. in cm.

524.3. Volume of Tree Groups and Stands

See also No. 279.

531. Mine, I. **[Studies on the estimation of timber volume. (1) The basis of stratification or of allocation of samples in estimating volume of timber stands.]** *Bull. Tokyo Univ. For.* No. 44, 1953 (107–22). 16 refs. [Jap.jap.e.]

Discusses methods in which d.b.h., b.a., or volume of sample trees in relationship to total values for the stand are used and concludes that methods using volumes are most accurate, followed in turn by b.a. and d.b.h. *From author's summary.*

532. Mihajlov, I. Koristenje na metodot na najmalite kvadrati pri sostavuvanje na ednovlezni masovi tablici. **[Application of the method of least squares for the preparation of volume tables based on diameter alone.]** *God. Zborn. zemj.-šum. Univ. Skopje* 3, 1951 (3–69). 16 refs. [Maced.g.]

533. Whitman, J. A., and Slocum, G. K. **Volume tables for stumps.** *Tech. Bull. N.C. agric. Exp. Sta.* No. 8, 1953. pp. 16.

It is often necessary to determine the volume of portions of stumps in excess of heights specified in timber sale contracts. To meet this need, the authors have constructed bd.-ft. and cu.-ft. volume tables for excessive stump height.

534. Taylor, R. F. **Cubic form class volume tables for southeast Alaska.** *Tech. Note Alaska For. Res. Cent.* No. 6, 1950. pp. 1 + 11 tbls.

The tables, based on measurements of 415 trees in form classes 70–95 (calculated from diam. u.b. at top of first 16-ft. log divided by d.b.h. o.b.), show gross cubic volume u.b. from a usable stump to a 6-in.-top, since pulp sale contracts call for utilization to a 6-in. top if merchantable.

535. Taylor, R. F. **Preliminary cubic form class volume tables for White Spruce in Alaska.** *Tech. Note Alaska For. Res. Cent.* No. 15, [1953]. pp. 7.

The cubic volumes of 68 measured White Spruce trees were consistently 4% higher than those of S.E. Alaska cu. ft. tables for Sitka Spruce. To provide volume tables for the Interior until new ones can be constructed from a greater number of trees, those for Sitka Spruce have been raised 4%.

536. Rapraeger, H. A. **Total height volume tables for Western Hemlock, Sitka Spruce, and young-growth Douglas Fir (based on 32-foot logs and on an 8-inch top).** *Res. Note Pacif. Nthwest For. Range Exp. Sta.* No. 82, 1952. pp. 6.

The tables were developed by adjusting tree volumes in existing tables, a large sample of measured trees of each of the 3 species being analysed to provide adjustment factors.

537. **Volume tables for permanent sample plots as recommended by the Puget Sound Research Center Advisory Committee for use in western Washington.** Pacific Northwest Forest and Range Experiment

Station, Portland, Oregon. 1953. pp. [2] + 28 tbls.

The tables comprise: (1) 'recommended' tables considered suitable for use in the area and containing data on cubic volume for entire stem and merchantable stem, and board ft. volume by the International and Scribner rules for *Pseudotsuga taxifolia*, *Tsuga heterophylla*, *Picea sitchensis*, *Abies amabilis*, and *Alnus rubra*; and (2) 'interim' tables, constructed from data outside the Puget sound area and suitable for use until improved tables are available, giving similar information for *Thuja plicata*, *Pinus contorta* var. *latifolia*, *Populus trichocarpa* and *Acer macrophyllum*.

538. Minor, C. O. **Preliminary volume tables for use with aerial photography.** *For. Fmr.* 12 (10), 1953 (9–11).

These preliminary tables show, for (*a*) *Pinus palustris* and (*b*) other 'Southern' Pines, volume in (1) cu. ft., (2) bd. ft. (International rule), and (3) bd. ft. (Doyle rule), based on crown diameter in feet and total visible height on air photos. [Cf. *For. Abstr.* 13 (No. 1451).]

539. Cromer, D. A. N. **Volume tables for *Pinus radiata*.** *Aust. For.* 16 (1), 1952 (22–4). 3 refs.

Compares a Spanish and an Australian volume table.

540. Bowling, P. J. **A volume table for regrowth of some Tasmanian Eucalypts [mainly *E. regnans* and *E. obliqua*].** *Aust. For.* 15 (2), 1951 (87–95).

541. Emrović, B. Dvoulazne drvnogromadne tablice za poljski jasen. **[Volume tables for *Fraxinus angustifolia*.]** *Šum. List* 77 (3), 1953 (114–8). 4 refs. [Croat.e.]

Presents a volume table (vol. tabulated against d.b.h. and height) for *F. angustifolia* in Croatia, based on data from 162 stems, using Schumacher's logarithmic formula [*J. agric. Res.* 47, 1933 (719–34)] and Meyer's correction [*Res. Pap. Pa. St. For. Sch.* No. 7, 1941], and compares the values of the new table with those of Marković (*Šum. List* 1931 (627–41)) and with Schwappach's table for Oak; the former are some 7% lower and the latter some 20% higher.

524.6. General Surveys of Forests and Whole Tracts of Forest. Partial Enumeration Surveys, Timber Cruising

See also Nos. 2, 531, 574.

542. Vidal, P. L'aménagement des suberaies marocaines: procédé de description parcellaire. **[The management of Moroccan Cork Oak forests: a method of making compartmental enumerations.]** *Rev. for. franç.* 5 (7/8), 1953 (487–99). [F.]

The compartments in these forests are permanent divisions of 100–500 ha. The method is based on strips 200 m. apart; the enumerator fixes a 'station' every 200 m. along each of these lines, describes the stand structure and composition and tallies all the trees he can see from it. Very often the conditions of these forests are such that this gives in effect a total enumeration. Where the denseness of the vegetation or the topography render this impossible, the result is that of systematic sampling. The lines are drawn in the first place on a gridded map (1 : 20,000) and the 'stations' marked in and numbered in pencil by the surveyor as he steers a compass course through the forest. He also draws in clearings and gaps of 1 ha. and more as he goes along. The methods of tallying and describing stand structure and density are described in detail. It is claimed that in this way a stand of 100,000 ha. can be enumerated in ca. 650 man-days. No estimate of accuracy is given.

543. Kajfež, D. Krogi kot primerjalne površine za izmero sestojev. **[Circular sample plots for the determination of stand volume.]** *Gozd. Vestn.* 11 (4), 1953 (97–104). [Sloven.sloven.]

The author's own measurements made in 1950 show that, owing to the heterogeneity of forest stands in Slovenia, the determination of stand volume from measurements of circular plots occupying 5–6% of the total area, gives results differing up to 10% from those based on complete measurement; in some cases (for some diameter classes) the difference amounts to as much as 33%.

525. *Volume by Assortments. Merchantable Volume*

544. Zach, L. W. **Distribution of volume in southeast Alaska trees.** *Tech. Note Alaska For. Res. Cent.* No. 10, 1951. pp. 1.

Measurements were made on 193 trees (Western Hemlock, Sitka Spruce and Western Red Cedar). Tabulated results show % distribution of tree volume in 16-ft. and 32-ft. logs.

545. Klein, J. A. **Defect in the climax forests of southeast Alaska.** *Tech. Note Alaska For. Res. Cent.* No. 9, 1951. pp. 1.

Decay and excessive branchiness account for 97% of visible cull in climax stands. Site 1 contains 15% due to visible defect, sites 2–4 20% and site 5 30%. The largest trees on a site are the most defective. Sitka Spruce and Western Hemlock are less defective on better sites, Western Red Cedar on site 3. Cedar is twice as defective as Hemlock, and 20 times as defective as Spruce in diam. up to 35 in., Cedar remaining the most and Spruce the least defective in larger diam.; 20% of the Cedar, 11% Hemlock and 2% Spruce trees are more than 50% cull. All Cedars over 37 in. d.b.h. average more than 50% cull.

546. Babogredac, Đ. Utvrđivanje kvalitetne vrijednosti stabala i sastojina. **[Estimation of tree and stand quality.]** *Šum. List* 77 (3), 1953 (118–27). [Croat.croat.e.]

Presents an empirical formula for the determination of the 'coefficient of quality' of single trees, viz. $K = D\ [A + B + C - (a + b + c + \ldots)]$ where D is d.b.h. (cm.), A = length (in m.) of stem (10 cm. diam. min.), B = clearness of timber (m.) (7 cm. diam. min.) assessed according to certain criteria, and C = log length (m.) which according to Jugoslav standards can be utilized for veneer manufacture. The lower-case letters denote defects, viz.: a = curvature of the stem, b = spiral grain, c = defects due to canker, d = longitudinal cracks due to

frosts, lightning etc., e = butt defects, f = irregularities of surface, g = excentricity, h = rot, i = insect damage, all of these defects being evaluated according to certain rules. The coefficient for a stand is obtained by taking the arithmetic mean of coefficients for the single stems. This method has been applied in the Vinkovci Experiment Station (Croatia) for the systematic observation of variation in growing-stock quality.

526. *Log Measurement. Scaling*

See also Nos. 525, 749.

547. Staebler, G. R. **Long logs or short logs with the Scribner scale**. *Timberman* 54 (10), 1953 (66 . . . 70).

The Scribner log rule makes no allowance for taper, and hence the scale volume of a long log may be increased by cutting it into 2 or more short logs. A rule, based on rate of taper, diameter and length, has been constructed to show the volume of long logs as if they were cut and scaled as 2 logs. Using this rule a % difference table was constructed to show how much short-log scale exceeds long-log scale for different rate of taper. The table may be used for either harvested logs or standing trees; for standing trees another table shows the mean taper and mean diameter of log to be expected from trees of a given mean d.b.h. and merchantable height. *From author's summary.*

527. *Solid Volume of Stacked Products*

See Nos. 279, 649.

53. SPECIAL MEASUREMENTS OF TREES AND STANDS (CROWN DIMENSIONS, STAND DENSITY ETC.)

See also Nos. 522, 628.

548. Deetlefs, P. P. du T. **Means of expressing and regulating density in forest stands**. *J. S. Afr. For. Ass.* No. 23, 1953 (1–12). 16 refs.

Methods of expressing stand density are first reviewed and an illustration is then given of the application, to even-aged stands of *Pinus taeda*, of a regression equation in which stocking is expressed in terms of numbers of trees per unit area and total basal area.

54. ASSESSMENT OF SITE QUALITY

See also Nos. 30–1, 140, 522, 566, 570.

549. Hills, G. A. **The use of site in forest management**. *For. Chron.* 29 (2), 1953 (128–36).

A conference paper explaining the author's system of site classification. [Cf. *For. Abstr.* 12 (No. 832).]

550. Long, H. D. **The site climax as an indicator of site conditions**. *Pulp Paper Mag. Can.* 54 (7), 1953 (155, 157). [University of New Brunswick.]

Discusses very briefly a system of classification based on letters representing moisture conditions (dry, fresh, moist and wet) reflected by the vegetation, and numbers representing the climax tree vegetation.

551. Linteau, A. **Site classification [in the Canadian boreal forest.]** *Pulp Paper Mag. Can.* 54 (7), 1953 (147 . . . 155). 6 refs. [Forestry Branch, Ottawa.]

In investigations in the north-eastern coniferous section of the boreal forest in Quebec, soil, vegetation and forest stands of 17 catchments were sampled. Analysis of the data obtained permitted classifications of the forest associations into 6 main types: (1) herb and fern forest; (2) herb and moss forest; (3) moss forest; (4) moss and dwarf-shrub forest; (5) peat moss and dwarf-shrub forest and (6) lichen and dwarf-shrub forest; with subdivisions according to predominant ground cover and tree species into some 30 sub-types. The first 3 main groups are upland types, i.e. are found on mountain slopes or on well drained lowland; (4) includes both rapid and poor drainage, both associated with slow-growing forest; (5) includes swamps not entirely deprived of drainage or in which the water-table is lowered during the growing season; (6) consists of slowly evolving sub-climax types, probably resulting from fires, in dry situations. Results of investigations on 350 plots showed that the 6 associations and related site types formed 4 site classes of merchantable stands, with height of average dominant trees at 50 years for Class I 45–54 ft., II 35–44 ft., III 25–34 ft., and IV 15–24 ft. On an average, 91% of the plots examined fell within the range assigned to their type: investigations in W. Quebec and a study of literature on N. Saskatchewan showed that these types would be applicable there. The possibility of classifying forest sites using air photographs and a minimum of ground work is discussed. The classification showing the related site-quality classes is given in tabular form. [Cf. *For. Abstr.* 14 (No. 2528).]

552. Plair, T. B. **A forest land capability classification**. *Abstr.* in *Proc. Soil Sci. Soc. Amer.* 16 (3), 1952 (316). L.S.

It is proposed that all forest soils should be grouped into 4 capability classes, ranging from (A) highly productive soils with few or limited hazards as regards soil loss or damage, and only minor limitations in the use of equipment or the application of management practice, to (D) non-commercial forest land. Specific site indices or the slope groups, which would be included in any one capability class, could vary for each forest region, or subregion, but standardization can be used in defining the capability classes and subclasses.

56. INCREMENT, DEVELOPMENT AND STRUCTURE OF STANDS

See also Nos. 143, 188, 191, 198, 202, 205, 261 *et seq.*, 278.

553. Taylor, R. F. **First records of growth for southeast Alaska's young stands**. *Tech. Note Alaska For. Res. Cent.* No. 1, 1949. pp. 2. 1 ref.

Figures obtained by remeasuring 25 sample plots established 20 years earlier in stands ranging in age in 1948 from 65 to 170 years confirm the need for felling the old climax forest, estimated to average only 4000 merchantable cu. ft./acre, about half that

to be expected from second-growth at 80–100 years. They also indicate that yield tables published in 1934 can be used as a rough guide to future yields.

554. GODMAN, R. M. **What kind of trees make the best growth in southeast Alaska.** *Tech. Note Alaska For. Res. Cent.* No. 2, 1949. pp. 1.

Tabulated figures from 4 permanent sample plots, remeasured after 20 years in 1948 at ages ranging from 65 to 94 years, show that d.b.h. increment is far greater in Sitka Spruce than in Western Hemlock in all vigour classes. Rate of growth of both species increases with increasing diameter. Mortality occurs chiefly in the smaller diameters.

555. HAWLEY, N. R. **Growth of planted Slash Pine in Georgia.** *Sth. Lumberm.* 187 (2334), 1953 (60).

Gives particulars of diameter, b.a., cordwood and sawtimber volume and number of sawtimber trees in sample plots in an 18-year-old stand in 1953 as compared with 1948.

556. GOLGOFSKAJA, K. JU. O roste duba v baĭračnyh lesah v zavisimosti ot tipa lesa. **[The growth of *Quercus robur* in the steppe gulley forests as related to forest type.]** *Dokl. Akad. Nauk SSSR* 88 (2), 1953 (345–7). 8 refs. [Russ.] A.P.B.

Compares the height increment of Oak in 5 types of these coppice forests; owing to their coppice origin the trees grow rapidly in early youth, height increment culminating at 5–10 years in all types. After the culmination, height growth declines the more rapidly, the poorer the site.

561. *Increment in Height, Diameter, Basal Area, Form and Quality. Variations and Trends; Dendrochronology*

See also Nos. 81, 362, 564, 594.

557. CRUIKSHANK, J. W. **Ten-year diameter growth of selected tree species in South Georgia.** *Res. Note Stheast. For. Exp. Sta.* No. 20, 1952. pp. 1.

Gives tabulated figures, derived from a sample of trees of all crown classes and sizes, in the same proportion as they occur in the coastal plain of Georgia, showing diameter growth in 10 years for 8 diameter classes ranging from 6 in. to 20 in. for 5 softwood and 5 hardwood species.

558. JAZEWITSCH, W. VON. Beiträge zur Methodik der Jahrringchronologie. II. Die fraktionierte Gegenläufigkeitsstatistik. **[Methods in annual-ring chronology. II. The fractionated statistics of counter-trend.]** *Holzforschung, Berlin* 6 (3), 1952 (82–9). 3 refs. [G.g.e.] P.R.

[Cf. *For. Abstr.* 14 (No. 1431).] The previous paper dealt with the 'simple counter-trend statistics' based on the direction of the respective curve portion (ascending, descending, or horizontal). The 'fractionated counter-trend statistics' introduces a new quantitative element into the curve analysis. Each yearly section of every curve is graded according to its steepness. The advantages of the new method are demonstrated by examples.

559. JAZEWITSCH, W. VON. Jahrringchronologie der Spessart-Buchen. **[Annual ring chronology in Spessart Beech.]** *Forstwiss. Cbl.* 72 (7/8), 1953 (234–47). Numerous refs. [G.g.]

Presents data on: annual-ring growth in Spessart Beech over a period of 265 years (based on 7 specimens), and Beech from the Bavarian forests over a period of 297 years (22 specimens). After climatic factors mast years have the greatest influence on annual-ring width. A comparison of both records with that of Spessart Sessile Oak showed that there is greater similarity between the pattern of development of Spessart Beech and Oak than between the Beech of different regions.

560. DOBBS, C. G. **A study of growth rings in trees. Part III. The relation of 'lines' to summer weather.** *Forestry* 26 (2), 1953 (98–110). 11 refs.

The frequency of 'lines' of denser wood within the annual ring in Larch (*Larix decidua*) was compared with monthly records of rainfall and tables of droughts and rain spells in the Bristol region. Moderate correlations were found with June rainfall (inverse), days in summer droughts, and a ratio giving a measure of the maximum dry-wet contrast between successive months from May to August. This 'contrast ratio' showed a high degree of parallel variation. with 'line' frequency. A study of individual years suggested that the formation of a pronounced 'line' is associated with the occurrence of a spell of dry weather followed by a wet spell during the later part of the summer. 'Mid-lines' were found to be associated with a June drought breaking in July; late 'lines' with a dry-wet contrast in July or August, but in some trees these may be suppressed by the stoppage of growth. Vaguer 'lines' of lower frequency were associated in certain years, with wet spells not preceded by noticeable drought. Individual lines can thus be identified and roughly dated by some weather feature, so that their position sheds some light on the length of the growing season. It is suggested that 'lines' of denser wood may be occasioned by the killing or inactivating of mycorrhizal rootlets either by drought or by waterlogging, followed by partial recovery when the weather changes. This would accord with the theory that summer wood formation is normally associated with a developing water-deficit in the wood. [Cf. *For. Abstr.* 14 (No. 555).] *Author's summary.*

561. EIDEM, P. Om svingninger i tykkelsestilveksten hos gran (*Picea abies*) og furu (*Pinus silvestris*) i Trøndelag. **[Variations in diameter increment in *Picea abies* and *Pinus sylvestris* in Trøndelag.]** *Medd. norske Skogforsøksv.* 12 (1) (No. 41), 1953. pp. 155. 53 refs. [Nor.e.]

Gives in diagrams, graphs and tables (with English and Norwegian legends) annual-ring-width data for different parts of Trøndelag, based on about 182,000 measurements of nearly 62,500 different annual rings, from living material and old building timbers of Spruce and Pine, dating back to the 15th century. It was found possible to construct and use the same standard chronological scales for Trøndelag south-east of Trondheimsfiord and for areas round the inner part of the fjord but, pending further investigations, material from places near the coast should not be dated from scales based on inland

districts. A good agreement was often found between ring width and summer temperatures, where the information is available. Examples of the use of annual ring series in dating old buildings are given. Comparison shows that annual ring series for a number of years often show considerable resemblances for the two species but it is doubtful how successful dating one species by curves from another would be. There is a full English summary.

562. Boggess, W. R. **Diameter growth of Shortleaf Pine and White Oak during a dry season.** *For. Note Ill. agric. Exp. Sta.* No. 37, 1953. pp. 7. 13 refs.

Weekly measurements were made with a dial-gauge dendrometer of 75 trees in a 15-year-old *Pinus echinata* plantation and of 30 *Quercus alba* trees in a stand of native hardwoods [age not stated]. Soil moisture was measured concurrently at depths of 1·5, 3, 6, 12, and 20–24 in. Rainfall inside and outside the stand, air temperature, soil temperature, and evaporation were also measured. Both Pine and Oak made 80% of their basal-area growth by the end of June. Available soil moisture was exhausted throughout the profile by this time. The latter part of the growing season was characterized by sporadic periods of diameter increase, interspersed with periods of stem shrinkage: these are shown to be directly related to the availability of soil moisture.

563. Tryon, E. H., and Myers, C. A. **Periodic precipitation affects growth of Yellow Poplar on a West Virginia hillside.** *Castanea* 17 (2), 1952 (97–102). 11 refs.

Diameter growth of *Liriodendron tulipifera* was studied in relation to seasonal precipitation. Only during the summer months (1 May–15 August) was there any significant relationship. A coarse C horizon, combined with the slope of the site studied is probably responsible for lowered soil moisture during dry summers, and the consequent sensitivity of the trees to precipitation.

562. *Volume Increment*

564. Loetsch, F. Massenzuwachsermittlung durch Bohrspanproben unter Anwendung mathematisch-statistischer Methoden. [**The determination of volume increment from increment cores using mathematical-statistical methods.**] *Z. Weltforstwirt.* 16 (3), 1953 (77–98). 33 refs. [G.g.e.f.]

Discusses the value for surveys of volume increment of Meyer's interpolation method [cf. *For. Abstr.* 14 (No. 553)] in which volume increment (v.i.) per 1 cm. diameter increment (d.i.), calculated from the difference between volume increments of successive diameter classes, is multiplied by the diam. growth per tree to give annual volume growth per tree. D.i. measurements from increment cores from 470 trees were used for calculating v.i. as above; these values for d.i. and v.i. are considered to be the true values. For sampling, increment cores of 19, 42 and 61 trees selected at random were used, and from the sample measurements straight lines for d.i.'s were found by the method of least squares, and volume increments by the interpolation method. Comparison between real and calculated values showed that the deviations always lay within the range of dispersion calculated statistically and coming within the probability theory. Stratification into crown classes before sampling gave still greater accuracy.

565. Staebler, G. R. **Mortality estimation in fully-stocked stands of young-growth Douglas-Fir.** *Res. Pap. Pacif. Nthwest. For. Range Exp. Sta.* No. 4, 1953. pp. 8.

The following equations, based on analyses of 36 widely scattered sample plots over periods up to 35 years, can be used to predict the % mortality for the next 10 years: (1) for dominant and codominant trees, $m = 4{\cdot}96 + 0{\cdot}08\,x - 0{\cdot}41\,y$ and (2) for intermediate and suppressed trees, $m = -13{\cdot}01 + 0{\cdot}54\,z + 0{\cdot}61\,x - 7{\cdot}83\,y$, where x = age, y = d.b.h. in inches, z = site index, and m = mortality %. The equations, although the data came from fully stocked stands, are probably reasonably adequate for medium and poorly stocked stands. Tables completed from the equations for ages 30–90 years, d.b.h. 6–30 in. and site class II–IV are also given.

564. *Forecasting Increment*

566. Holcomb, C. J., and Bickford, C. A. **Growth of Yellow Poplar and associated species in West Virginia as a guide to selective cutting.** *Sta. Pap. Ntheast. For. Exp. Sta.* No. 52, 1952. pp. 28. 10 refs.

Measurements, mainly of radial growth, were made on over 1800 trees, about half of them Yellow Poplar (*Liriodendron tulipifera*). On the basis of these, figures are tabulated showing average d.b.h. growth in the past 10 years and estimated growth for the next 10 (for Poplar and for associated species lumped), estimated number of years needed to attain different larger d.b.h., volume growth over the past and next 10 years, and estimated earnings over the next 10 years (for Yellow Poplar only) for 4 vigour classes, based on crown size and degree of dominance.

566. *Yield Tables and Their Construction*

567. Grandjean, A. J., and Soest, J. van. Opbrengstgegevens van de Douglas in Nederland. [**Yield data for Douglas Fir in the Netherlands.**] *Ned. Boschb.-Tijdschr.* 25 (9), 1953 (239–47). 8 refs. [Du.e.] (*Korte Meded. Bosbouwproefsta. T.N.O., Wageningen* No. 19.)

Preliminary yield figures, based on data from sample plots and forest inventories, are given in a graph (main crop only) and a table (main crop and thinnings, ages 5–75, quality classes 1–3). The results are compared with similar figures for Germany and Britain.

568. Taylor, R. F., and Klein, J. A. **Preliminary yield tables [based on 58 $\frac{1}{10}$-acre plots] for Alaska's interior forest.** *Tech. Note Alaska For. Res. Cent.* No. 14, 1953. pp. 6. 2 refs.

568. *Other Mensurational Studies of Stand Constitution and Changes therein. Distribution of Growth by Tree Classes etc.*

See also No. 185.

569. Magin, R. Zuwachsleistungen der

soziologischen Baumklassen in langfristig beobachteten Versuchsflächen. [**Increment from Kraft tree classes in Spruce trial plots observed over a long period.**] *Forstwiss. Cbl.* 71 (7/8), 1952 (225–43). 12 refs. [G.g.]

Analyses Bavarian data derived chiefly from two series of low-thinning trials in Norway Spruce. The relative share of different Kraft tree classes in the b.a. increment and/or volume increment of stands thinned from below is roughly proportional to their representation in the 'actual' basal area and/or volume of the stand; e.g. if class I accounts for 50% of the b.a. and/or volume of a stand, the same trees will produce ca. 50% of the basal-area and/or volume increment in one growth period. In making such predictions the period must not exceed 10–20 years if a large margin of error is to be avoided. In determining the past increment of stands, periods of less than 8–10 years should not be considered. The number of trees moving up to a higher class increases with increasing intensity of thinning, e.g. from 5% for grade B to 18% for grade C in the trials discussed. It is noted that in both series the trees moving from class 2 to class 1 showed almost the same diameter increment as those already in class 1. A distinction must be made between the volume increment of the tree of mean b.a. for a given tree class and that of the sum of individual trees in the class. The increment of the tree of mean b.a. for class 1 in B-grade thinnings averages more than twice (in C grade thinnings 1½ times) that of the mean tree for class 2. The relative difference in increment is therefore smaller with the heavier thinning. As regards the total increment of the tree classes, in one trial series (*a*) classes 1 and 2 contributed 96% of the volume increment, and accounted for 93% of stand volume under B-grade, and respectively 96 and 94% under C-grade thinnings. In the other series (*b*) there were greater differences between the grades, the respective figures being 85 and 85% for B, and 91 and 90% for C. The structure of the dominant portion of the stands was somewhat different as may be seen from the volume representation of tree class 1 viz. (*a*) B grade 50%, C grade 60%; (*b*) B grade 32%, C grade 40%.

58. SURVEYING AND MAPPING. AERIAL SURVEYS

See also No. 538.

570. VOLKERT, E. Die Grundsätze der Standortkartierung des Forsteinrichtungsamtes im Lande Rheinland-Pfalz. [**The basis of site-mapping carried out by the Forest Management Bureau of Rheinland-Pfalz.**] *Z. Pflanzenernähr. Düng.* 61 (3), 1953 (204–11). [G.g.] O.R.S.

Discusses briefly the main factors to be shown in a site map—temperature, water supply, topographical features, nutrients, and soil type.

571. **Manual of photogrammetry.** American Society of Photogrammetry, Washington. 2nd ed., 1952. pp. xiv. + 876. 16 pp. of refs. Price $12·50 ($9·00 to members).

A re-writing rather than a revision of the first 'preliminary' edition [cf. *For. Abstr.* 9 (No. 1356)], some 80% of the material being new.

572. LOSEE, S. T. B. **Review of progress in aerial survey for forestry in 1952.** *Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 1316(*A–2–b*), [1953]. pp. 5. 8 refs.

Discusses new methods and equipment and current research on photography, interpretation, map preparation and preparation of volume estimates.

573. Laporan sementara dari perangkaan rintis pertjobaan didaerah Siak-Mandau berkenaan dengan pemotretan dari udara. [**Preliminary reports on strip surveys based on aerial photographs in the forest division of Siak Mandau.**] *Rimba Indonesia* 2 (4), 1953 (170–3). [Jav.e.]

Compares the results of strip surveys with interpretations of aerial photographs made 14 years earlier. Data from 7 strips show that 2 must be discarded because the differences (due to changes in the forest) are now too great, 3 agree completely with the photographs, and the other 2 show considerable differences. The timber volume is 194–207 cu.m./ha. in dense forest, 140–151 in medium-stocked forest and 248–268 cu.m. in the 'kapur' forests.

574. ZACH, L. W. **Random plot cruising.** *Tech. Note Alaska For. Res. Cent.* No. 12, 1951 (1).

Field sampling by 1-, 2- and 3-man crews on 33 plots on 4540 acres estimated to be merchantable from air photographs showed that: (1) sampling required 1 man-day/252 acres using the 2-man crews found desirable for this region; (2) delineation of merchantable types is inaccurate on 1/40,000 scale photos, a much larger scale being needed for detailed work; and (3) getting cruisers on and over the ground is costly and difficult in S.E. Alaska.

6. FOREST MANAGEMENT. BUSINESS ECONOMICS OF FORESTRY. ADMINISTRATION AND ORGANIZATION OF FOREST ENTERPRISES

61. FOREST MANAGEMENT: GENERAL, THEORY AND PRINCIPLES

575. BRASNETT, N. V. **Planned management of forests.** George Allen and Unwin, London. 1953. pp. 238. Price 20*s*.

A textbook designed to provide students of forestry with a simple outline of what the management of forests involves, and the ways in which foresters, working in various conditions, have attempted to organize and control their operations. Part I defines the scope of forest management and describes the organization of forest crops both for the state and for the private owner. Part II gives procedures for the study of forests and for the preparation, execution, control, and revision of working plans for areas varying from valuable woods in developed countries to remote tracts of jungle. A thorough discussion is given of the methods of management and yield regulation tried

in differing conditions, and the results obtained from them. Finally (Part III) the author outlines the history of forests of Western Europe from the destructive exploitation which reached its peak in the 17th century, to the scientific management of the present day.

576. FRANCO, F. **Problems of forest management in the Philippines**. *Docum. FAO Asia-Pacif. For. Comm. 1952* No. 48, 1952. pp. 9 + 2 tbls. Limited distribution: FAO, Rome.

Includes notes on the various forest types and their management.

577. MILETIĆ, Z. Ophodnja i podmladno razdoblje kod postepene (oplodne) seče. [**Rotation and regeneration period in the uniform system.**] *Glasn. šum. Fak., Beograd* No. 5, 1952 (1–12). 10 refs. [Serb.serb.g.]

Contrary to the widely accepted view, it is concluded from two Jugoslavian samples that the rotation is not lengthened under the uniform system, since preparatory fellings in the younger age classes cancel out the effect of the higher age of trees retained over the young crop until the final fellings. It is further pointed out that yield regulation by area, rotation, and age classes can be successfully applied under the uniform system only when the general regeneration period is not longer than one period, i.e. 20 years.

62. WORKING PLANS. ANNUAL OR PERIODIC YIELD. YIELD REGULATION

See also Nos. 171, 570, 577.

578. KLEPAC, D. Uređivanje šuma s oplodnom sječom. [**Management of forests under the uniform system.**] *Glasn. šumske Pokuse* No. 10, 1952 (225–351). 177 refs. [Croat.croat.f.]

Part I discusses the main classical methods based on (1) area, (2) volume and increment, and (3) both principles combined. The French methods (permanent, revocable, or single periodic block, and the Duchaufour method) are compared with the Croatian management instructions of 1903 and 1931. The methods discussed include that of Tomić, a combined method similar to that of Heyer and now of historical interest only. Part II deals with a new method of management, suggested for the regular high forests of the Croatian plains and low hills, for almost all of which plans exist of the compartments and subcompartments. The method is based on the assumption that the author's 'computational' and 'silvicultural' management series [see *For. Abstr.* 12 (No. 844)] would be distinguished. Annual yield would be calculated by the single periodic block method, with modifications, applied to the 'computational management series'. Control would be based on complete emuneration (d.b.h. measurement of all trees) every 5 or 10 years.

64. FORESTRY AS A BUSINESS: GENERAL

579. DUERR, W. A., and VAUX, H. J. [Editors]. **Research in the economics of forestry**. Charles Lathrop Pack Forestry Foundation, Washington. 1953. pp. 475. Many refs. Price $6·00.

A joint work by a number of authors, the aim of which is stated to be (1) to define forest economics as a field of organized knowledge, and (2) to explore the methods of forest economics as a field of research. The illustrative detail is drawn almost entirely from the U.S.A.

65. SPECIAL BUSINESS PROBLEMS OF TIMBER-GROWING. CALCULATION OF COSTS AND PROFITABILITY. VALUATION

See also Nos. 191, 255, 262, 270–2, 278, 371, 1012.

580. BURGERS, T. F. La rentabilidad y la Contribución Territorial Rústica para eucaliptares y pinares de la provincia de Huelva. [**Profitability of Eucalypt and Pine stands in Huelva province and the land tax.**] *Montes, Madrid* 9 (51), 1953 (201–8). [Span.]

Seven theoretical types of area are considered (i.e. of varying acreage and on different soils) and estimates are presented of the costs of creating, maintaining and exploiting Eucalypt and Pine stands, and of the revenue that may be expected from them.

581. GUTTENBERG, S., and REYNOLDS, R. R. **Cutting financially mature Loblolly and Shortleaf Pine [as sawtimber]**. *Occ. Pap. Sth. For. Exp. Sta.* No. 129, 1953. pp. 18. 5 refs.

The steps used in determining the rate of value increase are (1) calculating the value of trees according to volume, grade and diameter, and (2) determining for typical growth rates the prospective rate of increase in tree value. Figures showing rate of value increase for different tree diameters and vigour classes (based on average diam. growth/5 years) and (Crossett) log grades are tabulated. A table to be used as a simplified marking guide shows for 3 vigour classes and 2 rates of return the maximum diameters of trees having no prospective increase in height and grade that should be left to grow for a further 5-year period. [Cf. *For. Abstr.* 13 (No. 4129).]

582. DUBERSON, J. H. **Allowable income tax deduction for shade tree damage [in the U.S.A.]**. *Shade Tree* 25 (10), 1952. pp. 5.

66. COSTING OF LOGGING OPERATIONS

See Nos. 324–5, 331, 583.

68. ADMINISTRATION AND ORGANIZATION OF FOREST ENTERPRISES

686. *Planning and Organization of Buildings, Transport Installations (Roads etc., including Power-line Rights-of-Way)*

583. HEIKKERÖ, T. E. Metsäautotie vaiko moottoritalvitie. [**Forest truck road or winter road for motor vehicles.**] *Metsät. Aikak.* 1953 (5), (146–8). 3 refs. [Fi.e.]

Discusses a previous article [*For. Abstr.* 14 (No. 2557)], stressing the advantages other than that for timber transport, of a permanent road, and concluding that the case for winter roads is less strong than was previously stated. *From author's summary.*

7. MARKETING. ECONOMICS OF TRANSPORT AND THE WOOD INDUSTRIES

See also Nos. 579, 592.

71. MARKETING OF FOREST PRODUCTS: GENERAL

584. OSTRANDER, M. D. **Production and marketing of wood piling and poles in the Northeast.** *Sta. Pap. Ntheast. For. Exp. Sta.* No. 57, 1953. pp. 23. 7 photos. 6 tbls.

585. DOUGLAS, E. **The structure of the Iowa retail lumber industry.** *Res. Bull. Ia. agric. Exp. Sta.* No. 395, 1953 (221–92). 49 refs.

72. THE QUANTITATIVE ASPECTS OF MARKETING. DEMAND, CONSUMPTION AND SUPPLY

See also No. 1003.

586. **Tropical timber: production and consumption prospects.** Organization for European Economic Co-operation, Paris. 1953. pp. 68.

Report of a committee of experts which has considered replies from a number of countries to questionnaires on increasing the use of tropical hardwoods. The report, a sequel to an earlier one [cf. *For. Abstr.* 12 (No. 2964], contains chapters on: Production of tropical timber; Consumption of tropical timber; Cost-price calculation; Price comparison between tropical and non-tropical species; Names of species, grading rules, and standardization; and Annexes: Statistics on export of some overseas territories; Final uses of tropical timber in some member countries; Swiss memorandum on tropical timber.

587. MACGREGOR, J. J. **World timber and pulp —requirements and supplies.** *World Crops* 5 (3), 1953 (93–7). O.R.E.

Discusses factors affecting world requirements and supplies during and after the war and the work of FAO and ECE, and reviews the state of the markets and problems of the post-war era.

588. Danmarks forsyninger av skogindustriprodukter. **[Denmark's supplies of forest products.]** *Inform. Skogind. økon. Inst.* No. 4*A*, [1951?]. pp. 4. [Nor.]

Gives figures for production and import of timber, pulp and paper products for 1938, and 1947–9.

589. STOVER, W. S., and CHRISTOPHER, J. F. **1952 pulpwood production in the South.** *For. Surv. Release Sth. For. Exp. Sta.* No. 72, 1953. pp. 35.

73. PRICES

See also No. 586.

590. MACGREGOR, J. J. **Recent trends of United Kingdom timber supplies, costs and prices.** *Quart. J. For.* 47 (3), 1953 (180–7).

The movement of the prices since 1938 of some standard but important home-grown timber products, chosen to reduce variations due to quality, are compared with those for timber imports. A comparison is also made with the corresponding movement of certain items in costs of production. *Author's summary.*

78. ECONOMICS OF TRANSPORT

See also No. 341.

591. MELAMA, N. Puutavaran kaukokuljetuskustannusten vertailua. **[Comparisons of timber transport costs.]** *Metsät. Aikak.* 1953 (5), (123–5). [Fi.e.]

Until 1939, floating was much the cheapest method of long-distance transport, but since the war differences have decreased. Floating is still generally the cheapest method but in certain special conditions road and rail transport offer competition. *From author's summary.*

8. FOREST PRODUCTS AND THEIR UTILIZATION

592. KRAEMER, J. H. **Wood conservation bibliography: a selection of references in the field of production and utilization of lumber and other wood products.** *Domestic Commerce Series, U.S. Department of Commerce, Washington, D.C.* No. 30, 1952. pp. 77. Price 40 cents (5*s.*).

Lists by title 2737 articles, bulletins etc. from the beginning of the century under the headings: production and equipment; construction and products; wood needs and market outlets; physical properties and uses of native woods; foreign woods; value of research programmes; veneer, plywood and laminates; moisture relations and seasoning; durability and preservative treatment; and utilization of wood waste.

593. **1951 Supplement to book of ASTM standards including tentatives. Part 4. Paint, naval stores, wood, adhesives, paper, shipping containers.** American Society for Testing Materials, Easton, Pa. 1951. pp. xiii + 253. P.R.

Includes: (1) Tentative specifications for wood to be used as panels in weathering tests of paints and varnishes; (2) Tentative method of tests for methoxyl groups in wood and related materials, and (3) Tentative nomenclature of domestic hardwoods and softwoods. The specification for wood block flooring, end grain, creosoted, for interior use, was adopted as standard in 1951.

81. WOOD AND BARK: STRUCTURE AND PROPERTIES

594. KLAUDITZ, W. Vorrichtung zur Entnahme von Holzproben aus stehenden Bäumen für Untersuchungszwecke. **[Device for taking wood samples for tests from standing trees.]** *Holz Roh- u. Werkstoff* 11 (6), 1953 (211–2). 2 refs. [G.g.] P.R.

The device (illustrated) consists of a manually operated hollow drill mounted in a frame that can be firmly attached to the tree. The wood samples

(cores) extracted are 57 mm. in diam. and up to 43 cm. long.

810. *General Information on Woods*

See also Nos. 108, 742.

595. Louis, J., and Fouarge, J. Essences forestières et bois du Congo. Fascicule 1. Introduction. **[Forest tree species and timbers of the Congo. Fascicle 1. Introduction.]** Institut National pour l'Étude Agronomique du Congo Belge, Brussels. 1953. pp. 72 + 15 plates + 1 tbl. 23 refs. [F.]

Five fascicles of this work, each dealing with a single species, have already appeared [cf. *For. Abstr.* 11 (No. 183)]. The present introductory volume deals with wood properties in general, and the properties required for the principal uses of wood.

596. Fouarge, J., Gérard, G., and Sacré, E. Bois du Congo. **[Timbers of the Congo.]** Institut National pour l'Étude Agronomique du Congo Belge, Brussels. 1953. pp. 424 + 41 plates + 1 tbl. 52 refs. [F.] Price *Fr.*400.

Gives, for 41 species, nomenclature, anatomy, physical and mechanical properties, working qualities, durability and uses, illustrated by photomicrographs.

597. Pfeiffer, J. R. **Western hardwoods—a promising industry.** *Repr.* from *National Hardwood Magazine, Memphis, Tenn.* March, 1953. pp. 4.

Includes tables showing available supplies, working properties and strength properties of a number of species, including *Alnus rubra, Acer macrophyllum, Arbutus menziesii, Castanopsis chrysophylla, Fraxinus oregona, Lithocarpus densiflorus, Quercus garryana, Q. kelloggii* and *Umbellularia californica.*

598. Thomas, A. V. **The timber of Upun Batu (*Upuna borneensis*).** *Malay. Forester* 16 (3), 1953 (163–5). 1 ref.

599. **Trees and timbers of Sarawak.** *Leafl. For. Dep. Sarawak* Nos. 5–8, [1953]. pp. 4; 11; 6; 11.

(5) Notes on *Agathis alba* and *Dacrydium elatum* (silvicultural characters, wood, gum and oil), and shorter notes on *D. falciforme, Podocarpus polystachyus* and *P. neriifolius.*

(6) Notes on silvicultural characters and timber of a number of *Dipterocarpus* spp. ('Keruing'); damar resin (from *Shorea, Hopea* and *Dipterocarpus* spp.); and Illipe nuts (seeds of a number of *Shorea* spp.).

(7) Silvicultural characters, increment, timber, and camphor, of five species of *Dryobalanops.*

(8) Silvicultural characters and timber of *Calophyllum* spp., *Garcinia* spp., *Mesua ferrea* and *Cratoxylon* spp.

600. Tamesis, F., and Aguilar, L. **Important commercial timbers of the Philippines, their properties and uses.** *Popular Bulletin, Department of Agriculture and Natural Resources, Republic of the Philippines, Manila* No. 32, 1951. pp. 83 + 5 plates.

Contains: (1) General notes on timber; (2) information on 65 Philippine species, their distribution, availability, size, and general features of the wood; (3) short sections on the physical properties of timber and on seasoning; (4) uses of timber, with a classification showing the species most suitable for different purposes; (5) a classification of Philippine trees into 4 groups for the purpose of collecting royalty on trees felled in the public forests; and (6) information on weights, strength properties and durability of Philippine timbers.

601. **The properties of Australian timbers: Huon Pine [*Dacrydium franklinii*].** *For. Prod. News Lett. C.S.I.R.O.Aust.* No. 190, 1952 (7).

602. **Specimen woods Nos. 211–3.** *Suppl.* to *Wood* 18 (7–9), 1953 (263–4; 305–6; 347–8).

Wamara (*Swartzia leiocalycina*); Alstonia (*A. congensis*); and Siamese Kwao (*Adina cordifolia*).

603. Lamb, G. N. **Foreign woods.** *Wood, Chicago* 58 (5), 1953 (42, 44). P.R.

Cojoba (*Cojoba arborea*); Tropical Walnut (*Juglans* sp.), and Garapa (*Apuleia leiocarpa*).

604. Keylwerth, R. Südamerika. Louro vermelho. **[South America. *Ocotea rubra.*]** *Holz Roh- u. Werkstoff* 11 (3), 1953 (119–20). 5 refs. [G.] P.R.

Tabulated wood properties.

811. *Structure, Identification*

See also Nos. 708–10, 713.

605. Moskaleva, V. E. Metodika issledovanija stroenija drevesiny v otražennom svete. **[Method of investigating the structure of wood by reflected light.]** *Trud. Inst. Les.* 4, 1949 (80–4). 2 refs. [Russ.]

Describes the use of microscopy in reflected light when sections for transmitted light cannot be easily obtained. An opaque-illuminator, epi-condenser, or the standard metallographic microscope can be used. Specimens of compressed wood were prepared in the same way as metallographic specimens, by consecutive polishing with finer and finer emery paper and woollen cloth. Lignostone was cleanly cut with a sharp chisel and examined under a low-power binocular microscope, followed by an examination through a standard microscope in reflected light. The use of reflected light enhances the unevenness of surface, all projecting elements being very bright. The photomicrographs show zones of failure in compressed Pine wood and Lignostone, fracture of (Birch, and Spruce) charcoal, and a vessel in the wood of Lime.

606. Carpenter, C. H., and Leney, L. **382 photomicrographs of 91 papermaking fibers.** *Tech. Publ. N.Y. St. Coll. For.* No. 74, 1952. pp. viii + 152. 382 photos. Price $2·00.

Includes photomicrographs of 34 conifers and 35 hardwoods with 16 miscellaneous plants, including a Bamboo, showing the cells or cell aggregates exhibiting the diagnostic characteristics considered most reliable in identification. Also includes a glossary and indexes to scientific and common names.

607. Johnston, D. R. **Structure drawings to 'Specimen woods' Sheets 25–7.** *Wood* 18 (7–9), 1953 (262; 307; 349).

(25) Laburnum (*L. anagyroides*), Apple (*Malus pumila*), Pear (*Pyrus communis*), and 'Tasmanian Oak' (*Eucalyptus* spp.); (26) Wych Elm (*Ulmus*

glabra), American White Oak (*Quercus alba*), Red Pine (*Pinus resinosa*) and Butternut (*Juglans cinerea*); (27) Afzelia (*Afzelia* spp.), Landa (*Erythroxylum mannii*), Maracaibo Boxwood (*Gossypiospermum praecox*) and Eteki (*Lophira alata* var. *procera*).

608. Ho, T.-H. **The woods of ancient China.** *Quart. J. Taiwan Mus.* 1 (4), 1948 (15–22). 14 refs. [E.chin.]

Describes the structure of the following timbers found in tombs and dating from the 14th century B.C. to the 8th century A.D.: *Cephalotaxus drupacea* and *Picea wilsonii*.

609. Ho, T.-H. **Wood structure of *Tsuga longibracteata* and *Taxus chinensis*.** *Quart. J. Taiwan Mus.* 2 (1), 1949 (34–43). 18 refs. [E.e.chin.]

Describes the wood structure of *Taxus chinensis* and *Tsuga longibracteata*, comparing the latter with *T. yunnanensis*, *Abies fabri*, *Keteleeria davidiana* and *Picea wilsonii* and discussing the relationships of the various genera within the sub-family Abietoidea.

610. Ingle, H. D., and Dadswell, H. E. **The anatomy of the timbers of the south-west Pacific area. II. Apocynaceae and Annonaceae.** *Repr.* from *Aust. J. Bot.* 1 (1), 1953 (1–26 + 9 plates). 14 refs. (*Repr. For. Prod. Aust.* No. 182).

Cf. *For. Abstr.* 11 (No. 1089).

611. Leroy, J.-F. La structure du bois d'*Annamocarya*. Notes sur le bois des noyers et autres Juglandacées. [**The wood structure of *Annamocarya*. Notes on the woods of the Juglandaceae.**] *Rev. int. Bot. appl. Agric. trop.* 33 (367/368), 1953 (216–20). [F.] P.R.

Describes the wood of *Annamocarya sinensis*, comparing it with the very similar *Carya tonkinensis*, discusses the frequency of scalariform perforation plates and the number of bars in *Alfaroa*, *Engelhardtia* and *Oreomunnea* spp. and considers the grouping of genera within the Juglandaceae in relation to wood structure.

612. Tumanin, S. A. K anatomičeskoĭ harakteristike roda *Sorbus* L. [**Anatomical characters of the genus *Sorbus*.**] *Trud. Inst. Les.* 4, 1949 (85–90). 6 refs. [Russ.]

Presents tabulated results of an investigation on the wood structure of the following *Sorbus* species: *S. aria*, *S. aucuparia*, *S. boissieri*, *S. domestica*, *S. graeca*, *S. sambucifolia*, *S. tianschanica*, and *S. torminalis*. The genus *Sorbus* is the least homogeneous of all genera of the subfamily *Pomoidae*, as far as wood structure is concerned. One table gives the following features: ring-porous or diffuse-porous structure; parenchyma (diffuse or diffuse and metatracheal); rays (homogeneous or heterogeneous); vessel spirals. Another table gives the diameters of vessels in the early and late wood, and the number of rays in 1 mm. of the growth-ring circumference.

613. Reinders-Gouwentak, C. A. **Sonneratiaceae and other Mangrove-swamp families, anatomical structure and water relations.** *Flora Malesiana, Djakarta* (*Ser. I*) 4 (4), 1953 (513–5). [Kebun Raya Indonesia, Bogor.] Numerous refs.

811.1. Anatomical Elements and Tissues

See also Nos. 81, 618–9, 629, 654–5, 658, 671, 675, 830, 898–9.

614. Chattaway, M. M. **The occurrence of heartwood crystals in certain timbers.** *Repr.* from *Aust. J. Bot.* 1 (1), 1953 (27–38 + plates). 2 refs. (*Repr. For. Prod. Aust.* No. 181).

Crystals of very characteristic shape and colour have been observed in the heartwood of 52 hardwood species from 19 different families. They do not resemble the CaC_2O_4 crystals commonly found in many timbers and have never been found in sapwood. They appear first in ray cells, when these are in contact with a vessel element, and are frequently found in close association with fungal hyphae. An intensive study of the crystals in *Eucalyptus hemiphloia* and *E. sideroxylon* showed that they occur from the pith to a short distance from the outer edge of the heartwood, and from the base of the tree to the upper limit of the heartwood. The distribution in other *Eucalyptus* spp. appears to be similar. Crystals from *E. hemiphloia*, when examined by partition chromatography, gave chromatograms identical with those of ellagic acid, and it is probable that the crystals in other Myrtaceae are of a similar nature. Further research is needed in order to identify the associated fungi, and to determine the chemical composition of the crystals, and that of the heartwood extractives of woods in which they occur.

615. Baženov, V. A. K voprosu o linijah skoljženija vo vtoričnom sloe kletočnyh oboloček. [**Slip lines in the secondary cell wall.**] *Trud. Inst. Les.* 4, 1949 (168–73). 4 refs. [Russ.russ.]

Observations in polarized light reveal minute slip lines in both collapsed and non-collapsed wood. Microscopic investigation of the development of collapse in tracheid walls shows that the places of failure are defined by the direction of the slip lines. The fine slip lines develop into large ones, and the latter into failure. It has been found that, beyond the limit of plastic flow, the slip lines are observable on thicker sections, while below the limit of plastic flow they are better visible on thin sections. The angle of inclination of slip lines in the early wood is much greater than in late wood; for Pine the respective figures are 19·2° and 17·3°. *From author's summary.*

616. Tellerup, E. **Individual differences in the shape of wood rays in *Fagus sylvatica* L.: a wood anatomical investigation.** (Introduction and conclusion by M. Schaffalitzky de Muckadell.) *Årsskr. Vet.-Landbohøjsk.* 1953 (147–57). [E.] [The Arboretum, Hørsholm.]

In 1951–2, anatomical examinations were made on samples of wood of grafts made in 1938–9 of different clones of Beech [see *For. Abstr.* 9 (No. 2081)]. Samples from the lower part of the stems of 8 trees, 1 from each clone, were examined to find the value of q $\left(\frac{\text{length}}{\text{width}}\right)$ for the largest rays. Within the samples, the value of q was fairly constant, but there were differences between values for the different

samples. Further samples were taken from branch-wood of several different trees from each of 4 of the clones. The values of q for the 16 trees examined, set out on a logarithmic scale, clearly show clonal grouping and there is a close similarity to the diagram for the original samples set out in the same way. The possible relationship between technical qualities of the wood and the form of the rays is being examined.

617. CHOWDHURY, K. A. **The rôle of initial parenchyma in the transformation of the structure diffuse-porous to ring-porous in the secondary xylem of the genus *Gmelina* Linn.** *Repr.* from *Proceedings of the National Institute of Sciences of India, Delhi* 19 (3), 1953 (361–9 + 2 plates). 20 refs. X.

811.2. Special Features and Abnormal Structure

See also No. 889.

618. MATSUMOTO, T. **[Studies on compression wood. (1) Spiral cracks in the tracheid wall.]** *Repr.* from *J. Jap. For. Soc.* 32 (1), 1950. pp. 4. 7 refs. [Jap.e.] X.

Unlike previous workers, the writer found spiral cracks in compression wood only after it had been dried or treated with chemicals, not in the green wood.

619. MATSUMOTO, T. **[Studies on compression wood. (2). Length of tracheids in compression wood.]** *Repr.* from *J. Jap. For. Soc.* 32 (1), 1950. pp. 7. [Jap.e.] X.

Investigations on samples of *Thujopsis dolabrata* from heights of 0·3 and 1·3 m. and of *Chamaecyparis obtusa* from 0·1, 0·3 and 1·3 m. showed that (1) the normal relation (the wider the ring the shorter the tracheid) does not hold for compression wood; (2) in excentric stems, tracing round a ring starting from the minimum radius, tracheid length increases as the ring increases in width to the mean radius and then decreases until the maximum radius is reached; (3) tracheid length at the minimum radius is greater than that at the maximum radius for moderate amounts of compression wood, but the reverse is true when large amounts are present. *From author's summary.*

620. MATSUMOTO, T. **[Studies on compression wood. (3). Compression strength and failures in Sugi (*Cryptomeria japonica*.]** *Repr.* from *Bulletin, Morioka College of Agriculture and Forestry, Iwate University* No. 26, 1950 (89–95). 4 refs. [Jap.e.] X.

In a study of the lower (compressed) and upper side of leaning trees the following results were obtained: (1) the compression strength of wood increases with sp. gr. and for a given sp. gr. the strength of the lower side is slightly below that of the upper side; (2) the strength of both upper and lower sides increases with decreasing moisture content: $\sigma = 748 - 18\phi + 0{\cdot}119\phi^2$ (lower side) and $\sigma = 550 - 23{\cdot}3\phi + 0{\cdot}37\phi^2$ (upper side); (3) when the moisture content is low, buckling occurs in the tracheids and when it is high more or less regular concave curves appear; there are many irregular cracks in kiln-dry wood; (4) with high sp.gr. buckling occurs in the tracheids and with low sp.gr. more or less regular concave curves. *From author's summary.*

621. CAMPREDON, J. Le bois de réaction, veine rouge, cellules gélatineuses. Leurs caractères, leur influence sur l'utilisation du bois. **[Reaction wood, compression wood, gelatinous-walled fibres [tension wood]. Their characteristics, and their effect on wood utilization.]** *Rev. Bois Appl.* 8 (2), 1953 (3–7). 4 refs. [F.]

Discusses the formation, structure, and properties of the compression wood of conifers, and tension wood of broadleaved species.

622. JAYME, G., and HARDERS-STEINHÄUSER, M. Zugholz und seine Auswirkungen in Pappel- und Weidenholz. **[Tension wood and its effects in Poplar and Willow wood.]** *Holzforschung, Berlin* 7 (2/3), 1953 (39–43). 10 refs. [G.g.e.] P.R.

Discusses the results of two previous papers [cf. *For. Abstr.* 14 (Nos. 2613, 2851)].

623. JAYME, G., HARDERS-STEINHÄUSER, M., and MOHRBERG, W. **Influence of the tension-wood fraction on the chemical and technological usefulness of Poplar.** *Transl. Commonw. sci. industr. Res. Organ. Aust.* No. 1683, 1952. pp. 13 + 2 photos, 2 dgms. 11 refs. Transl. by M. Slade from *Papier, Darmstadt* 5 (19/20), 1951 (411–7). [Cf. *For. Abstr.* 14 (No. 2851).] Limited distribution. P.R.

811.4. Growth Rings. Early and Late Wood

See also Nos. 81, 639–40, 653, 669.

624. MAYER-WEGELIN, H. **The wood texture in the annual ring, and the determination of the proportions of early and late wood.** *Transl. Commonw. sci. industr. Res. Organ. Aust.* No. 1496, 1951. pp. 6 + 7 gphs. Transl. by H. E. Kijlstra from *Holz-Zbl.* 77 (5), 1951. Limited distribution.

Describes the application of the hardness feeler [see *For. Abstr.* 14 (No. 1510)] for the investigation of the boundary between the early and late wood, and for the assessment of the suitability of a given wood for different uses. Measurements to date have shown that (1) whereas hard (suppressed) Ash is characterized by a large proportion of l.w. of extreme hardness, 'soft' Ash wood either has many narrow growth rings with very soft e.w., or else the late wood is neither very hard nor very extensive; (2) on the average, Oaks with narrow rings have softer l.w. than wide-ringed Oaks; (3) in Larch a sudden increase of hardness is recorded when passing from e.w. to l.w. Results of measurements on Poplars, Ash, Larch, Pine, Spruce, Douglas Fir, *Chamaecyparis obtusa*, and Fir are shown in "hardness diagrams'. Diagrams for Pine, Douglas Fir, and Larch from the Larch/Pine type are characterized by a pronounced flattening at the peak, while those for Spruce and Fir from the Spruce/Fir type rise steeply and evenly without any flattening at the peak.

625. KANO, T. **[Forest biological studies on wood quality. (Report 5.) Annual ring width and summerwood percent of Todo Fir [*Abies* sp.] grown in the Atsuta district of Hokkaido.]** *Bull. For. Exp.*

Sta., Meguro, Tokyo No. 61, 1953 (1–40). 6 refs. [Jap.e.] [Cf. *For. Abstr.* 14 (Nos. 646–7).]

[Cf. *For. Abstr.* 14 (Nos. 646–7).]

Results of measurements on 41,465 annual rings are discussed and given in tables and graphs, and in summary tables in English showing the frequency of annual-ring widths 1–5 mm. for different storeys of the canopy, and according to the slope of the ground, and of summerwood % up to 50% for the same factors and in relation to annual ring width.

811.5. Sapwood and Heartwood

See also Nos. 614, 651, 665, 928–30.

626. Matsumoto, T. **[Mechanical study on heartwood.]** *Repr.* from *Science Bulletin, Faculty of Agriculture, Kyushu University* 13 (1/4), 1951 (230–3). 3 refs. [Jap.e.] X.

The continual movement of trees by external forces ensures that compressive stress is always present in the heartwood and tensile stress in the sapwood, while the intermediate zone is mechanically neutral. It is assumed that the breadth of the intermediate zone is determined by the need for the accumulation of a certain amount of compressive force before heartwood formation takes place.

627. Ito, M. **Studies on the heartwood and its quantity in trunk. (1) On the relation of heartwood percentage to age of tree for Asunaro (*Thujopsis dolabrata* S. et Z.) and Sawara (*Chamaecyparis pisifera* S. et Z.).** *Repr.* from *Science Report of the Faculty of Liberal Arts and Education, Gifu University* (*Natural Science*) No. 1, 1953 (63–8). 8 refs. [E.e.]

628. Hirai, S. **[The relation of branch amount to the wood, especially to the heartwood volume in Japanese Larch.]** *Res. Bull. exp. For. Hokkaido Univ.* 16 (2), 1953 (197–203). 2 refs. [Jap.e.]

Branch amount was reckoned as the total weight, including all shoots and leaves, of the branch. The branch amount/unit area of the stem cross-section tended to increase with height above the ground to the middle of the crown and then to decrease. The relationship between branch amount and sapwood area was similar. The branch amount/unit area of the heartwood cross-section increased with height, reaching its maximum at the heartwood tip. The branch amount varied irregularly with the area of the intermediate ('ripe-wood') zone. Correlation coefficients were calculated between branch amount and area of the total stem and of the different zones. The correlation of branch amount with both sapwood and heartwood area is influenced by the area of the stem cross-section, and that with the intermediate zone by stem diameter and number of annual rings.

629. Harris, J. M. **Heartwood formation in *Pinus radiata* (D. Don).** *Nature, Lond.* 172 (4377), 1953 (552). 1 ref. [Forest Research Institute, Whakarewarewa, N.Z.]

In a paper to be published shortly by the N.Z. Forest Service, it has been shown that conditions which are conducive to the occurrence of physiological drought retard heartwood formation in this species, but that where a deep root-system can be developed in an area with adequate rainfall but without drying winds of low humidity, heartwood formation is at a maximum. These findings are based on statistical analysis of data from 200 trees felled on 12 widely contrasted sites.

A further study of the bordered pits of wood tracheids in each growth layer from the cambium to the coloured heartwood suggests a mechanism whereby a maximum volume of sapwood would be retained to meet the demands of recurrent physiological drought. The % of bordered pits aspirated in a cross-sectional disk from a freshly felled tree is at a minimum (less than 5%) in the outermost annual growth layers, and increases in a regular manner according to the number of growth layers, to 50% in the innermost layers of sapwood. In the zone of 'dry' wood (m.c. 40%) which characteristically surrounds the coloured heartwoods, more than 95% of the pits are aspirated, and this condition is maintained in the coloured heartwood. This distribution of aspirated pits is independent of site quality. It is suggested that aspirated pits arise where a tracheid wall lies between one tracheid containing gas and one containing water. It has been shown statistically that when more than 50% of the pits are aspirated, the apertures remaining open can no longer be considered to provide a conducting system. This implies that the sapwood immediately contiguous to the heartwood is no longer a conducting system. The water in this tissue is therefore not subject to transpiration tension transmitted through the pits, but becomes freely available to the living cells of the wood rays and epithelial cells of the resin canals for the hydrolysis of stored food which is lost in this zone.

It is suggested that during conditions of physiological drought when transpiration tensions are high, the tension will not only be transmitted along the outer layers of sapwood which lie in a direct line between the transpiring leaves and the root hairs, but will also be transmitted with decreasing intensity across the resistance offered by successive growth layers and thence downward through the inner sapwood. While tension within the sapwood remains high, the water is not freely available to the living cells. If, however, the tension in the outer layer of wood is not very great, the force is greatly reduced before many growth layers are crossed, and in this case the water in tracheids at a lesser distance from the cambium becomes readily available. As this water is used, more bordered pits will become aspirated until eventually the critical point is reached when 50% of the pits are aspirated, the remaining free water becomes readily available, and the central core of wood is 'dried out'. Absence of physiological drought therefore permits the acceleration of the processes leading to loss of water from the central core of wood, which is an essential first step in the formation of heartwood in Pines, resulting as it does in the death of all cells and the accumulation of resins which undergo both physical and chemical changes during the formation of coloured heartwood.

630. **Physiology of heartwood formation.** *Rep. For. Prod. Res. Bd., Lond. 1952*, 1953 (10).

[Cf. *For. Abstr.* 14 (No. 1497).] The supplementary experiment on Oak, in which a bark girdle was cut at the top of the bole in addition to the main girdle at the base, has been concluded. Examination of the felled stems showed that no significant development of heartwood had resulted from this double girdling, but observations on the wood above the top girdle showed that as a result of the unusual conditions of nutrition and sap conduction, the proportion of storage tissue (rays and parenchyma) and fibrous tissue had increased and that of vascular tissue decreased, compared with the normal wood formed earlier. At the main girdle no healing callus developed, but tyloses were formed. This experiment suggests that callus formation is dependent on substances derived from the leafy crown but that in tylosis formation local stimulation is sufficient and food substances available in the immediate vicinity can provide all the raw material required.

631. CHATTAWAY, M. M. **The sapwood heartwood transition.** *Aust. For.* 16 (1), 1952 (25–34 + 3 plates). 6 refs.

The transition from sapwood to heartwood in certain species has been described in detail, and the formation of intermediate wood discussed. The distinction between sapwood and heartwood cannot always be clearly made on the basis of colour, or on the presence of starch or tyloses, but must be based on the fundamental change which lies behind these other features—the death of the cells of the vertical parenchyma and the rays. Some Australian timbers have a sharply defined heartwood, others have no heartwood, others have a band of intermediate wood, which is sapwood but approaches heartwood in some features. The formation and characteristics of this intermediate wood is described for three species, *Nothofagus cunninghamii*, *Sloanea woollsii*, and *Diospyros pentamera*. An explanation is offered of the paradox that the death of sapwood cells in the living trees causes changes that result in the formation of heartwood, but that these changes do not take place with the death of the sapwood cells on felling or when the whole tree dies. *From author's summary.*

811.6. Texture. Grain. Figure

See also Nos. 624, 888.

632. ITERSON, G. VAN. **Models and theories to lliustrate the mechanism of spiral growth.** *Transl. Commonw. sci. industr. Res. Organ. Aust.* No. 1784, 1952. pp. 13 + 5 photos, drawings, 2 dgms. 29 refs. Transl. by H. E. Kijlstra from *Verslag, Nederlandsche Akademie van Wetenschappen (Afdeeling Natuurkunde)* 52 (2), 1943 (58–68). Limited distribution. [See *For. Abstr.* 7 (No. 1596).] P.R.

811.7. *Phloem. Bark*

See also Nos. 70, 107, 887.

633. CHATTAWAY, M. M. **The structure of Eucalypt bark.** *For. Prod. News Lett. C.S.I.R.O. Aust.* No. 190, 1952 (1–3).

634. CHATTAWAY, M. M. **More about [Eucalyptus] bark.** *For. Prod. News Lett. C.S.I.R.O. Aust.* No. 192, 1952 (1–2).

Discusses and illustrates with photographs the value of bark structure in determining hybrid species and as an extra feature in distinguishing species that cannot be separated by wood anatomy.

812. *Physical and Mechanical Properties*

See also Nos. 709–13, 771.

635. PERELYGIN, L. M. Programma i metody fiziko-mehaničeskih ispytanií drevesiny. **[Programme and methods of physical and mechanical wood testing.]** *Trud. Inst. Les.* 4, 1949 (26–33). 6 refs. [Russ.]

The following minimum programme is suggested for a systematic investigation of the physical and mechanical properties of wood, that should be conducted in all regions of the U.S.S.R.: (1) structure: width of sapwood (for heartwood species); number of growth rings/cm.; % of late wood (for conifers and ring-porous broadleaved species); (2) physical properties: moisture content at different distances from the stem axis and at different points of the stem height; volume and linear (tangential and radial) shrinkage coefficients; oven-dry density and density at 15% m.c.; (3) mechanical tests: compression; tension; shear parallel to grain; static bending; impact bending; modulus of elasticity in compression parallel to grain; limit of plastic flow in compression parallel to grain; end and side hardness. This programme is suggested both for forests to be utilized during the current 5-year period and for those to be utilized later. Areas not utilized now, and not likely to be utilized soon should be investigated in accordance with a simplified programme, viz.: (1) as before; (2) shrinkage coefficients and density tests; and (3) compression parallel to grain. The methods of physical and mechanical tests should be those described in the Standard OST/NKLesa No. 250, with occasional modifications. The following tests are discussed in some detail: width of sapwood; number of growth rings; % of late wood; moisture content of the growing stem; shrinkage coefficients; density (oven-dry and at 15% m.c.); compression parallel to grain; tension parallel to grain; shear parallel to grain; static bending; impact bending; modulus of elasticity in compression parallel to grain; limit of plastic flow in compression parallel to grain; end and side hardness; fibre-saturation point; shear in different directions; impact shear; glueline strength; field (simplified) tests, and torsion test.

636. KINGSTON, R. S. T. **The mechanical and physical properties of Hoop and Bunya Pine.** *Aust. J. appl. Sci.* 4 (2), 1953 (197–234). 34 refs. P.R.

Material from 36 trees of Queensland-grown *Araucaria cunninghamii* and 30 trees of *A. bidwillii* has been tested for mechanical properties, the results being tabulated for both species. Properties other than strength are briefly mentioned. Variations in the properties of wood of both species with distance from pith, height in stem, and between trees and localities are discussed. Correlations between various mechanical properties and between

these and density are included. The properties of the two species are compared, and shown against those for Sitka Spruce. Design stresses for Hoop and Bunya Pines are recommended. Hoop Pine, even more than Bunya, has a combination of desirable qualities such as relatively high mechanical properties, medium density, relatively low shrinkage, freedom from defects, and ease of working, which give it a high value for many purposes. *From author's summary.*

637. STILLINGER, J. R. **Strength and related properties of second-growth Port Orford White-Cedar.** *J. For.* 51 (8), 1953 (555–9). 5 refs.

Tests on both green and dry second-growth *Chamaecyparis lawsoniana* timber (test data tabulated) indicated that no significant difference existed in strength properties, sp. gr., shrinkage, or working qualities between second- and old-growth timber of this species.

638. HIRAI, S. **[Wood properties of *Larix leptolepis* from a plantation in the Tokyo University Forest at Yamanaka, Yamanashi prefecture.]** *Bull. Tokyo Univ. For.* No. 44, 1953 (139–51 + 1 tbl.). 24 refs. [Jap.e.]

Results of tests on physical and mechanical properties are given in tables and in an English summary table.

639. VIHROV, V. E. Stroenie i fiziko-mehaničeskie svoĭstva ranneĭ i pozdneĭ drevesiny sibirskoĭ listvennicy. **[Structure and physical and mechanical properties of *Larix sibirica*.]** *Trud. Inst. Les.* 4, 1949 (174–94). 19 refs. [Russ.]

Presents the results of an investigation on specimens of *L. sibirica* wood, taken at a height of 1·3–1·55 m. from a 205-year-old stem of 62 cm. d.b.h. and 39·5 m. height, felled in an experimental area (association *Pinetum oxalidosum*) in the Archangel region. The relationship between the growth-ring width and width of the late-wood portion of the ring had a high correlation coefficient, 0·659 ± 0·04, the late-wood % varying in different rings from 10–13 to 40–47%. Although the wall thickness of late tracheids was twice that of early tracheids, the cross-section areas of the cell wall of both types of tracheids were equal; the surface 'porosity' of early wood was 66%, that of late wood 21%. Several rows of intermediate tracheids were observed between the early and late ones, the width of this zone being ca. 25% of the whole growth ring. The thicknesses of the tracheid cell wall, secondary layer, and middle lamella in the late tracheids were ca. twice those in the early tracheids. In the following, the first figure refers to the early and the second to the late wood: oven-dry density 0·383, 0·863 g./c.c.; maximum m.c. 206, 80%; shrinkage—volume 13·43, 22·8%, radial 1·57, 7·10%, tangential 7·87, 13·9%; volume 'porosity' 75·3, 46·7%; tensile strength 442, 1510 kg./sq. cm.; static bending strength (m.c. 9%) 483, 2509 kg./sq. cm., (m.c. over 30%) 258, 1047 kg./sq. cm.

640. STREKALOVSKIĬ, N. I. Fiziko-mehaničeskie svoĭstva drevesiny severnoĭ eli. **[Physical and mechanical properties of the wood of northern Spruce.]** *Trud. Inst. Les.* 4, 1949 (102–7). 7 refs. [Russ.]

Results of measurements on samples from 221 Spruce stems felled in the northern part of Russia-in-Europe (age 140–240 years) show that both the macrostructure and the mechanical and physical properties of the wood change as the location moves southwards: the width of growth rings somewhat increases, and the % of late wood very slightly decreases; density changes are negligible. Changes of greater significance are found in the mechanical properties of Spruce wood growing under identical conditions but in different geographical latitudes: e.g. the maximum load in compression parallel to the grain first increases and then decreases as the site moves southwards. The increase in the % of late wood has a much smaller effect on the increase of mechanical strength in Spruce than in Pine or Larch. The relative late-wood/early-wood tracheid wall-section area is only 1·95 for Spruce, but 2·35 for Pine and 3·58 for Larch.

641. HORVAT, I. Prilog poznavanju tehničkih svojstava duglazijevine (*Pseudotsuga taxifolia* var. *viridis* Asch. et Gr.) **[Technical properties of Douglas Fir wood.]** *Šum. List* 77 (3), 1953 (105–14). 20 refs. [Croat.croat.f.]

Presents tabulated results of tests on wood specimens taken from 5 Douglas Fir logs at heights between 1·3 and 3 m. The stems, felled in a Slovenian forest, averaged 41 cm. d.b.h. and 37 m. length; age 63 years. In the following figures the bracketed values are the average ones: ring width 1·38–10·00 (3·53) mm.; late wood % 27–72 (47·7) %; density—air-dry (12·2% average m.c.) 0·442–0·787 (0·590), oven-dry 0·419–0·769 (0·564), nominal 0·402–0·593 (0·486) g./c.c.; shrinkage: [to air-dry?] radial 4·24–7·46 (5·70), tangential 5·00–11·09 (8·65), volume 9·78–18·38 (14·39) %; compression strength 374–816 (559), bending strength 1001–1808 (1302) kg./sq. cm., and work to maximum load 0·369–1·46 (0·793) kg.m./sq. cm.

642. KRZYSIK, F., and GONET, B. Fizyczne i mechaniczne własności drewa niektórych gatunków i krzyżówek topoli. **[Physical and mechanical properties of the wood of some Poplar species and hybrids [in Poland].]** *Sylwan* 96 (4), 1952 (433–68); 97 (1), 1953 (28–46). 35 refs. [Pol.russ.e.]

Presents tabulated and graphed results of 6129 measurements on wood specimens taken from 3 stems of *Populus alba*, 4 of *P. canescens*, 2 of *P. berolinensis*, 3 of *P. tremula*, and 2 of *P. deltoides*, 10 of the trees being 21–31 years and the remaining two 50–59 years old, and all being free-grown except *P. tremula*. Heartwood varied from 11·6 to 43·5% of the volume. Moisture content of the sapwood varied from 64·7 to 131·6%, that of the heartwood from 67·8 to 191·1%. The growth rings varied in width from 3·5 mm. (*P. canescens*) to 10·4 mm. (*P. deltoides*). The oven-dry density of *P. canescens* wood from two sites averaged 0·386, and 0·515, g./c.c., respectively. Average porosity varied from 66·6% (*P. canescens*) to 79·6% (*P. berolinensis*). *P. deltoides* seems to give best results in the plantation growing of pulpwood.

643. VIHROV, V. E. Fiziko-mehaničeskie svoĭstva drevesiny lipy (*Tilia cordata* Mill.). **[Physical and mechanical properties of Lime wood (*T.*

***cordata*).]** *Trud. Inst. Les.* 4, 1949 (147–53). 14 refs. [Russ.russ.]

The coefficients of correlation between the width of the growth rings on the one hand, and the density and strength of wood, on the other, are small, inverse, and mostly uncertain. The variation of moisture content along the radius in freshly felled stems is very slight. No marked differences have been found between physical and mechanical properties of Limes from the *Fraxineto-Quercetum* and from the *Tilieto-Quercetum. From author's summary.*

812.1. Optical, Acoustic, Frictional, Thermal and Electrical Properties

See also Nos. 666–8.

644. MROST, M. **Investigation of the thermal decomposition of wood.** *South African Mining and Engineering Journal, Johannesburg* 63, 1952 (793–5). P.R.

Presents some results of an investigation on (*a*) the spontaneous combustion of wood at higher temperatures, and (*b*) flashing of a flame along a trail of inflammable gases evolved from wood; the wood in both cases being distant from the source of heat. Tests were made on pure cellulose and timber specimens (*Pinus rigida*, *Eucalyptus saligna* and *Acacia mollissima*), both preservative-treated and untreated; the heating rate was ca. 6° C./min. and the air-flow rate adjusted to that in a poorly ventilated area. For cotton-wool, tests at different heating and air-flow rates showed a sharp rate of temperature increase at ca. 300° C., indicating an ignition temperature independent of the conditions of heating. Similarly, the outlet gases collected did not maintain an applied flame until the temperature of 300° had been reached. The results for oven-dry timbers were very similar to those obtained with cellulose, while for *P. rigida* of 10% m.c. the net increase in temperature over the range 110–290° was higher than for oven-dry wood. Decayed *E. saligna* showed the same behaviour as the sound wood, but its outlet gases did not support a flame at any given temperature. *P. rigida* treated with Celcure, or with $Na_2SiF_6 + ZnSO_4$ gave results similar to those for untreated timber. The analysis of outlet gases corroborated the assumption that active decomposition of the wood occurs at ca. 300°.

645. YAVORSKY, J. M. **A review of the electrical properties of wood.** *Tech. Publ. N.Y. St. Coll. For.* No. 73, 1951. pp. 27. 25 refs.

646. KRÖNER, K., and PUNGS, L. Über das Verhalten des dielektrischen Verlustfaktors von Naturholz im grossen Frequenzbereich. **[Behaviour of the dielectric loss factor of native wood over a large frequency range.]** *Holzforschung, Berlin* 7 (1), 1953 (12–8). 26 refs. [G.g.e.] P.R.

[Cf. *For. Abstr.* 14 (No. 641).] Measurements of the dielectric loss factor in wood specimens cut in the 3 main directions (T.S., R.L.S., T.L.S.), at frequencies of 3×10^2–10^9 cycles/sec. for oven-dry and moderately dried (to 11·8% m.c.) Spruce, and at very low frequencies (from 33 to 10^4 cycles/sec. for Beech wood (m.c. to 9·9%). Both anisotropy in different cut directions and dispersion were observed in the dielectric loss factor, as they have also been in dielectric constant. A broad maximum of the loss factor occurs at ca. 10^7 cycles/sec. The anisotropy of the loss factor is explained by the macroscopic wood structure.

812.2. Behaviour with Liquids and Gases. Moisture Relations etc.

See also Nos. 74–5, 620, 668, 670, 781, 835, 876, 889, 935.

647. HERZIG, J. Bestimmung der Tränkreife von Holzmasten und Schwellen mit dem elektrischen Siemens-Holzfeuchtemesser. **[Using the Siemens electrical moisture meter for determining if wooden poles and sleepers are ready for impregnation.]** *Holz Roh- u. Werkstoff* 11 (5), 1953 (179–82). [G.g.] P.R.

Describes a series of m.c. determinations carried out with pin-type and clamp-type electrodes, and gives a calibration table obtained by the drying-oven method for both electrodes, wood surface and disk sample, for the m.c. range 15–25%.

648. WYZANOWICZ, H. **Determination of moisture in wood.** *Prace Inst. Celuloz.-Papier.* 1, 1952 (83–5). [Pol.] From *Chem. Abstr.* 47 (13), 1953 (6653*f*). P.R.

The construction and performance of the Lange electric moisture meter (1950 model) is described. The method is rapid and suitable for routine control in pulp mills.

649. REICHERT, T. Neues Holzuntersuchungsverfahren zur Bestimmung von Feuchtigkeit, Derbgehalt, Raumdichtezahl, Rohwichte, Schwund und spezifischem Gewicht. **[A new method of determining the following data for wood: moisture content, solid content of stacked wood, basic density, oven-dry density, shrinkage, and specific gravity.]** *Holz-Zbl.* 76 (86), 1950 (938–40). [G.]

Describes the application of the 'Hygrodasymeter', an instrument designed recently in Germany for determining different physical properties of wood.

650. SUZUKI, Y. **[Studies on Bamboo. (IX). Water relations of Bamboo (*Phyllostachys pubescens*).]** *Bull. Tokyo Univ. For.* No. 44, 1953 (159–86). 19 refs. [Jap.e.]

The following conclusions are drawn from experiments: (1) The high moisture content of Bamboo is probably due to the osmotic pressure caused by the semi-permeable membrane and the concentration of water-soluble extractives in the sap of parenchyma cells. (2) The cell membrane is not broken and continues to function for at least a month when Bamboo is soaked in water at room temperature, but is easily broken in water at over 60° C. or when dried in air, allowing the escape of water-soluble extractives in the cells and other solubles. (3) About 8–20% of dried Bamboo consists of extractives soluble in cold water, with a water solubility and hygroscopicity similar to those of invert sugar. Air-drying rate of green Bamboo is lower than that of extracted wet Bamboo mainly because of the lowering of vapour pressure caused

by the concentration of extractives in the sap. (4) At high relative humidities, especially those over 85%, the Bamboo culm, apart from the outer portion, which is rich in fibres and poor in hygroscopic extractives, has a very much higher hygroscopicity than wood, reduceable, however by removing the water-soluble extractives. (5) Fibre-saturation point of an extracted portion of the outer part of the culm is about 5% below that of the inner extracted part or of wood. (6) Water penetration into dried Bamboo occurs much more rapidly than into wood, but penetration into extracted Bamboo is slower than into wood. (7) Green Bamboo tends to collapse during the early stages of seasoning. The collapse of the inner wet part is partly restrained by the outer drier part, distribution of strain varying with the shape of the piece. Heating in water and steam will correct this defect. Slow drying causes more collapse than rapid drying at the same temperature. (8) The mechanism of shrinkage differs from that of wood. A linear relationship exists between shrinkage and moisture content, but the parenchyma tissue shrinks much less than that of wood and the vascular tissue as much as fibres or tracheids of wood of the same sp. gr. (9) Swelling is roughly equal to shrinkage, but above 15% m.c. the swelling/sorption relation is no longer linear. (10) Wet heating of green Bamboo causes irreversible swelling in all directions. Equilibrium m.c. of hot-water-extracted Bamboo at high humidities is rather higher than that of Bamboo extracted with cold water. This suggests that the fibre saturation point is permanently increased by wet heating. [Cf. *For. Abstr.* 14 (No. 3717).] *From author's summary.*

651. Baženov, V. A., and Vihrov, V. E. O vlažnosti drevesiny v svežesrublennom sostojanii. **[Moisture content of freshly felled wood.]** *Trud. Inst. Les.* 4, 1949 (56–65). 2 refs. [Russ.]

Presents results of an investigation on the distribution of moisture in freshly felled broadleaved trees: 22 Oaks of 130-200 years, and 5 *Ulmus effusa*, 6 *U. campestris*, 11 Ash, 3 *Salix alba*, 4 Aspen, 2 *Populus alba*, 2 *Acer platanoides*, and 12 Lime, all between 50 and 70 years. The original weight of specimens was determined in the forest, immediately after felling. The results show that, in broadleaved species with heartwood, there is no sharp difference between the moisture content (m.c.) of heartwood and sapwood, and that the relationship between the two m.c.'s depends on the species and site; in some species, e.g. *Ulmus* spp., the heartwood m.c. is higher. The m.c. of Ash wood is very near to fibre-saturation point. The distribution of moisture in the stem of Oak depends on the site. Seasonal variations of m.c. in its heartwood are greater than in the sapwood; diurnal variations in the latter were smaller than the differences between the individual stems. No difference has been observed between the m.c. of heartwood and of sapwood in Lime. To discover the rôle played by heartwood and sapwood in the movement of water, 25- to 30-year-old Oak, *Ulmus effusa*, Lime, and Aspen trees were stood immediately after felling, in vessels containing water coloured with methyl violet, for 1–1½ days, until the leaves began to wither. Oak and *Ulmus effusa* (species with heartwood) and Aspen were found to have all their sapwood coloured. Lime was coloured throughout. In Oak stems, the dye solution rose in the wide vessels of the early wood, and partly also in the narrow vessels of late wood. Sapwood rays were not coloured. Between the coloured (violet) sapwood, and the (brown) heartwood of Oak, a 3- to 4-mm.-wide sapwood zone maintaining the natural colour of sapwood was observed. That Aspen is not a sapwood but a ripewood species was confirmed by the reaction of cross-cut sections to a 10% alcoholic solution of I. The data are tabulated by species and graphed.

652. Malmquist, L. Beobachtungen zur hygroskopischen Hysterese von Holz oberhalb 100° C. **[Observations on the wood moisture content hysteresis above 100° C.]** *Holz Roh- u. Werkstoff* 11 (5), 1953 (174–5). 1 ref. [G.g.] P.R.

A kind of hysteresis could be observed in absorption/desorption experiments with Pine and Spruce specimens, when the time curve of the specimen weight was analysed. A hysteresis loop of ca. 2% moisture content was obtained, which is at variance with previous findings [cf. *For. Abstr.* 14 (No. 1682)]. It seems that the weight-changes occur discontinuously.

653. Pentoney, R. E. **Mechanisms affecting tangential vs. radial shrinkage.** *Abstr. of thesis*, in *J. For. Prod. Res. Soc.* 3 (2), 1953 (27–32, 86). 29 refs. [New York State College of Forestry, Syracuse.] I.F.B.

The different theories of shrinkage are discussed. In samples of rapidly grown Douglas Fir, shrinkage measurements were made on isolated late wood and early wood and on total wood from a single annual ring. Results showing the tangential and radial shrinkage and the ratio between them (T/R) of the total wood are tabulated and equations given for tangential and radial shrinkage of total wood in % and for the T/R ratio expressed in terms of the isolated shrinkages, elastic constants and volumes of late and early wood. It is concluded that Mörath's theory of the effect of the alternation of late and early wood on shrinkage largely explains the observed differential shrinkage of the total wood, but not the shrinkage of the isolated late and early wood.

654. Matsumoto, T. **[The anisotropic shrinkage of wood.]** *Repr.* from *Bulletin, Morioka College of Agriculture and Forestry, Iwate University* No. 26, 1950 (81–8). 3 refs. [Jap.e.] X.

Frey-Wyssling's experiments were repeated [cf. *For. Abstr.* 3 (135)] but the results obtained did not confirm his theory that swelling and shrinking take place in the middle lamella which is a pectic substance. It was found that in lignified wood most of the middle lamella is a lignin substance and that swelling and shrinking take place not there but in the secondary layer of the cell wall. *From author's summary.*

655. Haden, R. V. **Shrinkage [of wood and type of ray].** *Rep. imp. For. Inst., Oxf. 1951/52*, 1953 (18).

A study was made of the shrinkage of blocks of wood from a large number of species within a

botanically related group of families, including the Meliaceae, Simarubaceae and Burseraceae. A correlation was found between radial shrinkage and type of ray: the more heterogeneous types of ray, with relatively short procumbent cells, shrank more than woods with homogeneous rays. The relation did not hold for woods with uniseriate rays only, in which the influence of the rays appeared to be almost negligible.

656. **Shrinkage tests [on Beech].** *Rep. For. Prod. Res. Bd., Lond. 1952*, 1953 (13, 14).

Tests were made on samples restricted to $\frac{1}{8}$-in. thickness along the grain to minimize the development of stresses during drying. Matched samples were dried quickly or slowly at 6 temperatures. Results so far indicate that shrinkage in slow drying from green to zero moisture content was progressively greater with increasing temperature of drying, but that rapidly dried samples shrank less at high than at low temperatures. Results, shown in graphs, of drying tangentially-cut specimens slowly at 25 and at 70° C. show that: (1) there is a tendency for wood dried at high temperatures to expand in the early stages of drying; (2) shrinkage starts at about 50% m.c.; (3) shrinkage at 70° becomes roughly proportional to the moisture drop from an initial m.c. of about 45%; and (4) shrinkage at 25° becomes proportional to m.c. drop from an original m.c. of about 30%.

657. Baženov, V. A. O pronicaemosti drevesiny židkostjami. **[Perviousness of wood to liquids.]** *Trud. Inst. Les.* 4, 1949 (154–67). 2 refs. [Russ.russ.]

Presents graphed and tabulated results of an investigation on the passage of water, aqueous solutions of salts, syrup, wine, vodka, vegetable oils, and pickling liquors through wood of Pine (sapwood and heartwood), Oak (heartwood), Aspen, Lime, and Spruce, radially and tangentially. An apparatus is described in which the amount of the liquid absorbed by 1 or 2 cm. thickness of wood was determined by volume, and the amount given up on the other side of the specimen was determined gravimetrically. The woods tested were found to belong to 2 groups: (1) pervious to one or other of the liquids (Pine sapwood to salt solutions; Aspen and Lime to pickling liquors; Beech to vegetable oils, etc.), and (2) apparently impervious (Oak heartwood to water, wine, vodka, pickling liquors; Pine heartwood and Spruce ripewood to salt solutions; Lime to syrup). Sometimes an increase of specimen thickness made a wood impervious to a certain liquid. It is stressed that two factors are active in the motion of liquids across wood, viz. capillary passage, and diffusion, the former occurring above, and the latter below, the fibre-saturation point. The diffusion-type passage of water corresponds to the so-called moisture conductivity, and obeys the diffusion law. The two-stage movement of moisture in wood obviously occurs also during seasoning, the rate of which is determined by the thickness of the diffusion zone. The gradual deepening of the diffusion zone is responsible for the retardation of the rate of seasoning.

658. Behr, E. A., Briggs, R. D., and Kaufert, F. H. **Diffusion of dissolved materials through wood,** *Journal of Physical Chemistry, Easton, Pa.* 57 (4) 1953 (476–80). O.R.S.

The theoretical equations derived by Stamm [cf. *For. Abstr.* 9 (No. 301)] to describe diffusion through softwoods, were checked by measuring the diffusion rate of NaCl in water-impregnated, swollen wood and of naphthalene in benzene-impregnated, non-swollen wood in both longitudinal and transverse directions for samples of 5 softwoods. The relative diffusion values calculated from the equations agreed fairly well with measured values, allowing for the variability of dimensions of wood elements. In the longitudinal diffusion measurements with NaCl the smallest deviation from calculated values was with *Thuja occidentalis* and the greatest with *Larix laricina*, 12 and 22%, respectively, below the calculated values. In the tangential-diffusion measurements the measured values were $\frac{1}{3}$ to $\frac{1}{5}$ of the calculated values; this more marked divergence is probably due to the inexactness of some of the terms used in the relevant equation. The effect on diffusion of the wood structure of the species used is discussed.

659. Maass, O. **The problem of penetration.** *Pulp Paper Mag. Can.* 54 (8), 1953 (98–103).

Discusses research at the Pulp and Paper Research Institute of Canada on factors affecting rates of penetration of liquids or gases into wood and on the pretreatment of chips to remove air by different methods.

660. **Moisture content distribution in wood with one face in contact with water.** *Rep. For. Prod. Res. Bd., Lond. 1952*, 1953 (13).

[Cf. *For. Abstr.* 13 (No. 4187).] Tests were made on trays of Douglas Fir and Oak, filled with water for up to 1 year, with the lower faces exposed to air at two different humidities, and with the lower face in one instance coated with bituminous paint. The moisture drop from the wetted face to a depth of about $\frac{1}{5}$ the thickness of the wood was very steep and at this depth the moisture content was about 30%. On the exposed surface the m.c. tended to become very slightly higher than the equilibrium m.c. with the surrounding air. Coating this face with paint appeared to have surprisingly little effect on the general moisture distribution.

661. **Diffusion of water vapour through wood.** *Rep. For. Prod. Res. Bd., Lond. 1952*, 1953 (48–9).

The experiments on the flow of water vapour through discs of wood at various temperatures under a relative-humidity gradient of 100% have now been completed. The flow through 12 species in the 3 principal directions was investigated and the results, when reduced to a comparable basis, show that, except in Sitka Spruce, the magnitude of flow through all species and at all temperatures is greatest in the longitudinal and least in the tangential direction. In Sitka Spruce radial flow is slightly less than tangential flow; in other species 2–4 times the tangential flow. In all species the longitudinal flow is about 10–25 times the tangential flow. Temperature has a marked effect on the absolute magnitude of flow, which is approximately doubled in all directions on raising the temperature from 20 to

40° C., as a result mainly of the rise in vapour pressure. [Cf. *For. Abstr.* 13 (No. 4188).]

812.3. Density. Specific Gravity. Buoyancy

See Nos. 620, 649, 675, 889, 899.

812.7. Strength Properties

See also Nos. 615, 620, 624, 680, 707, 726, 741, 767–9, 771, 780, 784, 830, 848, 888, 936.

662. Scott, I. G., and Morris, J. E. **Measurement of strain in timber.** *For. Prod. News Lett. C.S.I.R.O. Aust.* No. 190, 1952 (3–6).

Discusses in some detail the advantages of using electrical resistance gauges to measure strain. [Cf. *For. Abstr.* 11 (No. 2762).]

663. Gérard, G. Critères statistiques appliqués aux essais de bois. [**Statistical criteria applied to timber tests.**] Association Belge pour l'Étude, l'Essai et l'Emploi des Matériaux, Brussels. 1953. pp. 23. 3 refs. [F.]

A conference paper on the use of statistical analysis on the data of timber tests.

664. Moulds, F. R. **Comparative strengths of the timber of Californian-grown and South-Australian-grown Monterey Pine (*Pinus radiata* Don.).** *Aust. For.* 16 (2), 1952 (100–4). 2 refs.

A comparison of mechanical properties of specimens of *Pinus radiata* grown in plantations in South Australia and in natural forest in California was made on unseasoned timber. Detailed results are given and the general conclusion reached that only slight differences exist between specimens of similar rate of growth. *Author's summary.*

665. Siemiński, R. Własności techniczne drewna twardzieli i bielu sosny zwyczajnej. [**Technical properties of the heartwood and sapwood of *Pinus sylvestris*.**] *Sylwan* 97 (2), 1953 (109–15). [Pol.russ.]

Results of tests on specimens from 7 stems (aged 97–180 years), both tapped and untapped, have shown that there are no essential differences between sapwood and heartwood as far as strength properties are concerned, and that age, bluestain, and resin content do not affect the strength of the wood or of glue joints.

666. Kitahara, K., and Chugenji, M. **Effects of heat treatment on the mechanical properties of wood.** *J. Jap. For. Soc.* 33, 1951 (414–9). From *abstr.* in *Rec. Res. Fac. Agric. Univ. Tokyo* No. 2, 1951/52 (1953), (70–1). [E.]

Samples of *Chamaecyparis obtusa* and *Fagus crenata* were heated at 150 and 200° C. in an electric thermostat for 1, 3, 5, 10 and 20 hr. Impact bending values were decreased by the heat treatment to $\frac{1}{2}$ that of untreated wood, after 5 hours at 150°, or 1 hour at 200°, and to $\frac{1}{5}$ after 5 hours at 200°. The Young's modulus was scarcely affected by treatment for 5 hours at 150°. At 200° the value for *C. obtusa* increased and then decreased gradually, while that for *F. crenata* was scarcely affected. The modulus of rupture was scarcely affected by 5 hours at 150° but decreased by about $\frac{1}{2}$ that of the original wood at 200°.

667. **The effect of temperature on the strength of timber.** *Rep. For. Prod. Res. Bd., Lond. 1952*, 1953 (19–20).

In initial tests on tension, the testing machine was installed in a kiln, a technique that gave satisfactory results over a range of 20–40° C. These showed that tensile strength $\perp$, and the modulus of elasticity, decreased significantly with increasing temperature. Preliminary tests on the effect of higher temperatures have been started by attaching to the testing machine a circular chamber completely surrounding the test piece, the temperature within it being accurately controlled by water circulating between an outer and inner wall; to ensure the constant moisture content of the specimen when it is heated to the required temperature, it is enveloped in a thin, tightly fitting latex-rubber coating.

668. **Effect of temperature on the elastic constants of wood.** *Rep. For. Prod. Res. Bd., Lond. 1952*, 1953 (47–8).

The effect of temperature on the 3 principal Young's moduli of Beech, Oak and Corsican Pine has been measured at relative humidities of 30, 60, 80, and 90%. The results show that at a given humidity the moduli decrease linearly with increase of temperature, although at 90% r.h. there is some evidence of a curvilinear relationship. Assuming, however, that the relationship is linear, the effect of temperature can be expressed by the equation $E_T = E_t\{1 - a(T - t)\}$ where E_T and E_t are the Young's moduli at temperatures T and t° C., T being the higher, and a is the mean temperature coefficient. Values of a for the 3 species over the temperature range 40–90° C. are tabulated. The temperature coefficients do not vary greatly between species nor between the radial and tangential specimens but the longitudinal modulus is only about half as sensitive to temperature change as the transverse modulus. During the experiments small specimens of the 3 species were suspended on quartz springs inside the oven and by measuring the length of the springs the moisture contents of the specimens were estimated and values at 30° tabulated. They were surprisingly low, ranging from 5 to 13% at 30°. The subsequent reduction in equilibrium m.c. after heating wood in a dry atmosphere is well known but the tabulated figures show that this reduction also occurs on heating in a moist atmosphere. Evidently the heating introduces irreversible changes in the wood, but the present experiments support the view that after heating for 1 or 2 days there is no further change. The temperature coefficients in the first table therefore refer to wood that has been conditioned by heating. [Cf. *For. Abstr.* 14 (No. 1509).]

669. Ivanov, Ju. M. O deformacijah i naprjaženijah v drevesine kak neodnorodnom materiale. [**Deformations and stresses in wood as a non-homogeneous material.**] *Trud. Inst. Les.* 4, 1949 (195–218). 5 refs. [Russ.russ.]

A theoretical analysis of the problem shows that the elasticity and strength indices of the total wood reveal definite relationships to properties of the early and late wood in its growth rings, and can be theoretically derived from the corresponding indices

for the early and late wood. When forces are applied parallel to the growth rings, the following has been established: (1) stresses in late wood are 2–4 times those in the early wood; (2) plastic flow begins in the early wood before the limit of plastic flow for the total wood is reached; this causes the particular kind of deformation known as pseudo-elastic after-effect; (3) plastic flow of the total wood, corresponding to the mechanical state of wood in the plastic-flow region, is brought about by the existence of simultaneous plastic-flow deformations in both early and late wood, whereas the limit of plastic flow of total wood is determined by the appearance of plastic flow in the late wood; (4) the value of the limit of plastic flow for total wood is greater than that for early and less than that for late wood; it can be evaluated by using an approximate formula.

670. Huhrjanskiĭ, P. N. Vlijanie vlažnosti na deformacii drevesiny sosny pri pressovanii. [**Effect of moisture content on the deformation of Pine wood under pressure.**] *Trud. Inst. Les.* 4, 1949 (247–60). 7 refs. [Russ.russ.]

Total and residual deformations were determined for Pine sapwood and heartwood specimens of different moisture content at 10–12° C., and of steamed specimens (m.c. 10–15%) at 80–90°. The results show that, for any degree of compression ⊥ and for any m.c. and temperature, a plastic deformation always accompanies the elastic one. The intermicellar liquid in the wood functions as a lubricant, affecting its internal-friction coefficient. This coefficient decreases as the thickness of the intermicellar liquid film increases and as its viscosity decreases. The lower this coefficient, the less the stress in the wood during compression, and the less its strength. The values of both elastic and plastic deformation during compression depend on the amount and viscosity of the intermicellar liquid. As the amount increases and the viscosity decreases, the elasticity under compression rises and the plasticity decreases. *From author's summary.*

671. Ivanov, Ju. M., and Vihrov, V. E. O pročnosti i uprugosti oboloček traheid drevesiny sosny pri sžatii poperek volokon. [**Strength and elasticity of the tracheid cell-wall of Pine wood when subjected to compression at right angles to the grain.**] *Trud. Inst. Les.* 4, 1949 (231–6). 2 refs. [Russ.]

In the late-wood (l.w.) specimens examined, the proportion of tracheid wall in the tangential direction averaged 61·8%, and in the radial direction 68·3% of unit length, corresponding figures for the early wood (e.w.) being 39·7 and 30·3%. The moduli of elasticity (radial compression) of the e.w. and l.w. tracheid wall, as calculated from the formula $E' = E/F_p$, where E is the modulus of elasticity of the e.w. or l.w., and F_p is the area of the respective tracheid wall, were: for early tracheids, 15,350, and for late tracheids, 27,300 kg./sq. cm., the corresponding values of the limit of plastic flow being 131·8 and 236 kg./sq. cm. The average stress acting simultaneously on tracheid walls of both kinds (tangential compression) was ca. 2·4 times that calculated for total wood. The average modulus of elasticity of tracheid walls was 21,100 kg./sq. cm., and the average limit of plastic flow, 187 kg./sq. cm., whereas the calculated limits of plastic flow (tangential compression) for early tracheid walls was 138 kg./sq. cm.

672. Ivanov, Ju. M. Predel plastičeskogo tečenija drevesiny sosny Zapadnoĭ Sibiri. [**Limit of plastic flow in wood of [Scots] Pine from Western Siberia.**] *Trud. Inst. Les.* 4, 1949 (141–6). 4 refs. [Russ.russ.]

The values of the limit of plastic flow for compression ∥ in Pine wood are found to have the standard statistical distribution. The average values of this magnitude for the wood of Pine in Western Siberia (moisture content 15%) vary from 296 to 309 kg./sq. cm., with a coefficient of variation of 14·6–17·5%, the [air-dry?] densities being 0·50–0·52. The limit of plastic flow (l.p.f.) examined is in direct correlation with density (correlation coefficient 0·62–0·74), and with the % of late wood (correlation coefficient 0·24–0·25). The ratio l.p.f./maximum load in compression ∥ is 0·733–0·774. *From author's summary.*

673. Ivanov, Ju. M., Baženov, V. A., and Sadovskiĭ, F. F. Opredelenie dinamičeskogo modulja uprugosti drevesiny. [**Determination of the dynamic modulus of elasticity of wood.**] *Trud. Inst. Les.* 4, 1949 (272–3). [Russ.]

Illustrated description of an apparatus designed in the physics section of the Forest Institute of the U.S.S.R. A wooden rod of standard length is clamped horizontally in a vice fixed to a heavy marble plate; two small iron plates are attached to the rod: one in the middle of its length, the other near the free end. An electromagnet is fixed immediately below each iron plate: the middle one transmits to the rod vibrations from an audio-frequency generator, while the vibrations of the rod are transformed by the second electromagnet into electric vibrations reproduced in a cathode oscillograph. The fundamental frequency is determined by the maximum amplitude. The value of the modulus of elasticity obtained by this method from a known formula corresponds to the static value determined by bending tests. The accuracy claimed is ± 1%, each determination (in a series of determinations), taking ca. 4 min.

674. Kitahara, K. [**A simple apparatus for testing Young's modulus in bending.**] *Bull. Tokyo Univ. For.* No. 44, 1953 (153–8). [Jap.e.]

The apparatus is illustrated, its principles are described and some examples given of results obtained on *Chamaecyparis obtusa* and *Fagus crenata.*

675. Jay, A. B., and Silvester, F. D. **Oak ladder rungs.** *Quart. Rev. Timb. Developm. Ass.* 3 (10), 1953 (1–3).

Impact tests were made on a batch of 100 Oak machine-made ladder rungs taken at random from stock to determine the main characteristics affecting strength. The rungs were conditioned to about 12% m.c. before preparation. The slope of the grain was determined and the number of rings/inch counted. After testing, the density of each rung was determined. Slope of grain was the most

important factor affecting rung strength in higher-density faster-grown timber. Low strength values were found for low-density slow-grown timber, and the fractures showed a high degree of brashness; in almost every failure due to brashness the material used was straight-grained, slow-grown and of low density. Further examination of the anatomy of the wood in the rungs tested showed that it could be divided into 5 groups as regards parenchyma content and a reasonably good correlation was found between these groups and the results of the mechanical tests, rungs having low parenchyma content and parenchyma narrow and clearly defined being most frequently those with the greatest impact strength (breaking at 4·40 to 2·95 kg.) while those with high parenchyma content and with parenchyma broad and ill-defined were most frequently of lowest strength (breaking at 0·80 kg.). The comparatively few exceptions were generally due to such factors as slow growth, or spiral or sloping grain. A statistical analysis will be needed before practical use can be made of this information.

676. SCHAEFER, W. Einfluss von Kerben auf die Zugfestigkeit nichtmetallischer Werkstoffe. [**The effect of notches and holes on the tensile strength of non-metallic materials.**] *Holz Roh- u. Werkstoff* 11 (3), 1953 (91–6). 8 refs. [G.g.] P.R.

Presents tabulated and graphed results of tests on the tensile strength of notched or holed solid wood (Pine, Beech), Beech plywood, laminated wood, and improved woods. The non-uniform stress distribution caused by notches and holes of different form varies from material to material. For solid woods, the determination of the notch effect is difficult owing to the scatter of the breaking load; this difficulty is much less for improved woods. The effect of notches and holes becomes manifest if one compares the tensile strength value found for notched specimens with the frequency value for normal specimens. The holed wood specimens give more favourable tensile strength values than those following from the theoretical normal stress.

813. *Wood Chemistry*

See also Nos. 897 *et seq.*

677. JENSEN, W. Institutet för träkemi vid Åbo akademi: verksamheten 1952–3. [**The work of the Institute of Wood Chemistry, Åbo Academy, 1952–3.**] *Pap. ja Puu* 35 (4*a*), 1953 (155–6). [Sw.e.] P.R.

Summarizes research on sulphate, sulphite and dissolving pulps from Birch, the chemical composition of suberin in cork and the outer bark of Birch, the chemical composition of rosins and their sizing properties, and the higher boiling fractions of sulphite fusel oil.

813.1. Chief Organic Constituents. Constituents of the Cell Wall

See also Nos. 838–41.

678. FUKUYAMA, G., HANZAWA, M., and KAWASE, K. [**Chemical composition of wood decayed under natural conditions.**] *Res. Bull. exp. For. Hokkaido Univ.* 16 (2), 1953 (243–80). 89 refs. [Jap.e.]

Sound, discoloured, partly decayed and completely decayed samples were taken from trees of *Picea jezoensis*, *P. glehnii*, *Abies sachalinensis*, *Larix leptolepis*, *Chamaecyparis obtusa* and *C. pisifera* decayed by different fungi. The results, given in tables [with English legends], include the following: (1) The density of the decayed wood decreased and the alkali solubility increased with decay. Three types of decay were found, brown and white rots and an intermediate type attacking cellulose and lignin equally. (2) Lignin was demethoxylated and its alkali solubility was increased. Cellulose was disintegrated and depolymerized; the white fibrous material left after decay by *Fomes jezoensis* contained 18·38% α-cellulose, 5·70% pentosan, and 60·30% material soluble in 1% NaOH, and had the empirical formula $C_{13}(H_2O)_{11}$. (3) The chemical composition and properties of the constituents of the decayed wood were so different from those of sound wood that some modification of the normal method of analysis was desirable. *From authors' summary.*

679. TRAYNARD, P., and AYROUD, A. M. Action du chlore en milieu anhydre sur le bois de peuplier. [**Action of Cl in an anhydrous medium on Poplar wood.**] *Bull. Soc. chim. France* 19, 1952 (1001–5 + 2 photos). 23 refs. [F.f.] O.R.S.

Cf. *For. Abstr.* 14 (No. 2607).

680. RÜNGER, H. G., and KLAUDITZ, W. Über Beziehungen zwischen der chemischen Zusammensetzung und den Festigkeitseigenschaften des Stammholzes von Pappeln. [**Relationships between the chemical composition of Poplar stemwood and its strength properties.**] *Holzforschung, Berlin* 7 (2/3), 1953 (43–58). 40 refs. [G.g.e.] P.R.

Investigations were carried out on specimens taken from 3 Poplar hybrids: *Populus* '*regenerata grandis*', *P. marilandica* and *P.* '*euramericana* Grafhorst'. The samples for chemical analysis were cut from the early wood of single growth rings, and had, consequently a diameter (or side of the square base) of 1·0 cm. and a height of 1·5 cm. The modified methods for the determination of cellulose, lignin, and pentosans, in samples of ca. 0·08–0·10 g. are described. The mechanical tests (compression and tension) were also made on samples prepared from single growth rings, the moisture content of the samples being usually 10%. The tensile strength was found to depend on the cellulose content; the compression strength, on that of lignin. The presence of tension wood blurs the results, since the over-all increase of cellulose content increases the tensile strength, but the simultaneous reduction of the over-all lignin content reduces the compression strength. The effect of the content of pectopolyuronides and of cellulosan on the strength properties is not clear. Investigations of 1- to 2-year-old Poplar saplings, exposed to mechanical stress during growth, showed that, while tension in the direction of growth does not alter the chemical composition of the wood, bending causes a considerable formation of reaction-wood with a corresponding differentiation of chemical composition (59·7 and 41·4% cellulose, and 16·4 and 25·7% lignin in the tension-wood and compression-wood zones, respectively). The wet tensile strength in the

tension-wood zone is greater than that in the compression-wood zone. Investigations on Willow twigs showed that the air-dry wood of 1-year-old Willows had a greater tensile strength than Poplar wood having an equal or greater cellulose content.

681. KLAUDITZ, W. Zur biologisch-mechanischen Wirkung des Lignins im Stammholz der Nadel- und Laubhölzer. **[The biological-mechanical effect of lignin in the stemwood of conifer and broad-leaved woods.]** *Holzforschung, Berlin* 6 (3), 1952 (70–82). 65 refs. [G.g.e.] P.R.

Cf. *For. Abstr.* 12 (No. 1180).

682. TOWERS, G. H. N., and GIBBS, R. D. **Lignin chemistry and the taxonomy of higher plants.** *Nature, Lond.* 172 (4366), 1953 (25–6). 16 refs.

[MacGill University, Montreal.].

Investigations on lignins of 50 species published in 1944 [cf. *For. Abstr.* 6 (p. 27)] showed that in every case it was possible to isolate syringaldehyde and vanillin from species giving a positive Mäule reaction, while vanillin only was obtained from those giving a negative reaction. Dicotyledons in general gave syringaldehyde/vanillin (S/V) values of about 3. Conifers in general, negative to Mäule's test, yielded no syringaldehyde, but about a dozen species of *Podocarpus* gave faint to strong positive Mäule tests, and those giving a strong positive reaction had S/V values of about 1. *Tetraclinis articulata* was strongly distinguished from other members of the Cupressaceae in that it gave a strong positive Mäule test and an S/V value of 0·8. Monocotyledons gave both syringaldehyde and vanillin and gave a positive Mäule test, while 3 species also yielded some *p*-hydroxybenzaldehyde.

Further investigations have now been made (data tabulated) to determine: (1) whether or not *p*-hydroxybenzaldehyde is restricted to monocotyledons; (2) to see if all the supposedly primitive dicotyledons have low S/V values; and (3) to look for unusual or suggestive ratios that might throw light upon plant relationships.

(1) It is clear that *p*-hydroxybenzaldehyde is far from restricted in its occurrence: it has been found in *Psilotum*, in several lycopsids, in *Equisetum*, in a fern, a cycad, several conifers, and all the monocotyledons examined. It appears to be absent, in general, from dicotyledons (present in *Tetracentron sinense* but absent from it probable relative *Trochodendron*).

(2) Results from 'primitive' dicotyledons are very variable, but further work is being done.

(3) Data have been obtained on about one-third of the known species of *Acer* (including the *Negundo* group) and the two species of *Dipteronia* (the other genus of Aceraceae). S/V values were usually high (average 2·0 for 14 spp.) in *Acer* proper, low in the *Negundo* group (0·5–0·6) and in *Dipteronia* (1·0 and 0·3). Quantitative Mäule tests roughly parallel the S/V values. Most true Maples gave a strong HCl/methanol reaction, while the *Negundo* group gave no, or a very weak reaction; *Dipteronia* gave a deep colour with this reagent. It is concluded that the *Negundo* group differs sufficiently from the other species of *Acer* to be set aside from them, thus reviving Moench's old genus *Negundo*.

683. MANSKAJA, S. M., and BARDINSKAJA, M. S. Lignin formirujuščejsja drevesiny. **[Lignin of nascent wood.]** *Biohimija* 17 (6), 1952 (711–8). 18 refs. [Russ.] E.M.B.

Presents tabulated and graphed results of an investigation on the formation and accumulation of lignin-type aromatic compounds in nascent wood at different moments of the period of growth, and on the experimental oxidation of coniferyl alcohol by enzymes obtained from the wood. Vanillin and syringaldehyde have been found to accumulate during the lignification of the near-cambium layer (nascent wood). It can be concluded that an oxidative condensation of aromatic compounds occurs in the nascent wood of later growth date. Coniferyl alcohol oxidized by a peroxidase obtained from a freshly collected near-cambial layer of Pine (or from sugar-beet) yielded oxidized polymer compounds very similar to those which Freudenberg obtained by the action of an enzyme from mushrooms. The compounds obtained were characterized by: (1) a higher molecular weight and lower C and H content than coniferyl alcohol, and (2) absorption curves similar to those of 'native' lignins. The results confirm the authors' theory according to which coniferyl alcohol, under the action of the reduction/oxidation reactions accompanying the enzyme reactions of the respiration metabolism, is oxidized during lignification and transformed into condensation products of the lignin type. [Cf. *For. Abstr.* 14 (No. 1522).]

684. WACEK, A. v., HÄRTEL, O., and MERALLA, S. Über den Einfluss von Coniferinzusatz auf die Verholzung von Karottengewebe bei Kultur *in vitro*. **[The effect of an addition of coniferin on the lignification of carrot tissues cultivated *in vitro*.]** *Holzforschung, Berlin* 7 (2/3), 1953 (58–62). 11 refs. [G.g.e.] P.R.

The degree of lignification of pieces of carrot tissue cultivated on culture media, has been found to be considerably higher in samples grown with than without an addition of coniferin.

685. YAMASHITA, T., and YONEZAWA, Y. **[Studies on lignin. I. The ultraviolet absorption spectrum of gymnosperm lignin and its analogues.]** *Journal of the Japanese Technical Association of the Pulp and Paper Industry, Tokyo* 4 (3), 1950 (9–12). [Jap.] From *Chem. Abstr.* 45 (22), 1951 (10578*f–g*). P.R.

686. ENSLIN, P. R. ***Acacia mollissima* Willd. III The purification of native Black-Wattle lignin.** *J. sci. Food Agric.* 4 (7), 1953 (328–31). 17 refs. O.R.S.

[Cf. *For. Abstr.* 13 (No. 4219).] An absorption chromatographic method for the separation of isolated native lignin from such impurities as tannins and phlobaphenes is described. The pure native lignin is characterized by its elementary analysis, methoxyl content, molecular weight, ultra-violet and infra-red absorption spectra and behaviour on paper chromatograms. The results of nitrobenzene oxidation indicate that the lignin is of the guaiacyl-syringyl type. *From author's summary.*

687. **[Acid-soluble and modified lignins.]** *Rep. For. Prod. Res. Bd., Lond. 1952*, 1953 (39).

It was found that for both Spruce and Beech lignins there is very little difference between the absorption spectrum of the acid-soluble and the modified lignins [see *For. Abstr.* 14 (No. 1526)]. This suggests that the main conjugating system is the same in the two products and is little affected by the addition of Cl_2 and HCl in the modified lignins. [Cf. *For. Abstr.* 14 (No. 3743).]

688. Hlava, J. B., and Brauns, F. E. Über die Oxydation von Willstätter-Lignin und methyliertem Willstätter-Lignin und über das Verhalten von Veratrumaldehyd unter den gleichen Versuchsbedingungen. **[Oxidation of Willstätter lignin and methylated Willstätter lignin and the behaviour of veratraldehyde under the same conditions.]** *Holzforschung, Berlin* 7 (2/3), 1953 (62–6). 10 refs. [G.g.e.] P.R.

The experiments show that vanillin obtained by oxidation with $C_6H_5NO_2$ or by alkaline hydrolysis from completely methylated lignin compounds can originate not only from the central structural members of lignin but also from the veratraldehyde formed.

689. Sohn, A. W. Versuche zur Steigerung des phenolischen Charakters von Lignin. **[Experiments on the enhancing of the phenolic nature of lignin.]** *Holzforschung, Berlin* 7 (1), 1953 (1–8). 15 refs. [G.g.e.] P.R.

Although it has been possible to add to the 2 phenolic groups of vanillin a third one by chlorination and exchange of Cl for OH, a similar reaction could not be induced with the 3 lignin preparations investigated.

690. Kratzl, K., and Billek, G. Über die Synthese von mit C^{14} markierten Ligninbausteinen. **[Synthesizing lignin structural elements labelled with C^{14}.]** *Holzforschung, Berlin* 7 (2/3), 1953 (66–70). 24 refs. [G.g.e.] P.R.

Describes syntheses enabling coniferin, syringin, and para-hydroxy cinnamyl alcohol glucoside to be labelled with C^{14} in the side chain.

691. Merewether, J. W. T. **Studies on the lignin of *Eucalyptus regnans* F. Muell. VII. The acid hydrolysis of ethanol lignin-A.** *Aust. J. Chem.* 6 (2), 1953 (156–61). 14 refs. P.R.

Results of hydrolysis with dilute HCl lend no support to the hypothesis that alcohol lignins are acetals, and favour the theory that the combined alkoxyl is probably present as ether. [Cf. *For. Abstr.* 14 (No. 3745).] *From author's summary.*

692. Merewether, J. W. T. **Studies on the lignin of *Eucalyptus regnans* F. Muell. VIII. The isolation of an ether-soluble ethanol lignin.** *Aust. J. Chem.* 6 (2), 1953 (162–5). 2 refs. P.R.

The ether-soluble fraction (ethanol lignin-B) differs only slightly from the previously described ether-insoluble fraction (ethanol lignin-A).

693. Stewart, C. M., and Harvey, L. J. **Subproject C.13–1. The differentiation and maturation of cells derived from the cambium. Progress report No. 3. The distribution and nature of 80% ethanol solubles, tannins, nitrogenous materials, lignin and carbohydrate substances in *Eucalyptus regnans* F. v. M.** Division of Forest Products, C.S.I.R.O., Melbourne, 1952. pp. 24 + 1 photo + 1 tbl. 27 refs. P.R.

There is relatively little cellulose in the freshly differentiated cells of the cambial zone. Hemicelluloses of the phloem are very different in composition from those of the wood. Tannins are present in very small amounts in the cambium; proteins and nitrates in large quantity.

694. Eguchi, H., and Suzuki, M. **Wood cellulose. I. Treatment of wood holocellulose with cold alkaline solutions.** *Journal of the Society of Textile and Cellulose Industry, Japan* 7, 1951 (36–9). [Jap.?] From *Chem. Abstr.* 46 (11), 1952 (5316*a–b*). P.R.

As shown by the weight distribution curve of polymerization (by Philipoff-Hess's formula) holocellulose from *Abies sachalinensis* (free of fat and lignin) can be separated from hemicellulose by treating with 5–10% NaOH at 10° C. for 1 hour.

695. Rånby, B. G. **Fine structure and reaction of native cellulose.** *Thesis, University of Uppsala* 1952. pp. 22. 80 refs. [E.] [Institute of Physical Chemistry, University of Uppsala.] P.R.

A discussion, based partly on literature and partly on original research on cellulose from *Picea abies* and *Pinus sylvestris*, cotton, bacteria, animals and algae, on dimensions of the micelle strings composing the cellulose fibrils visible in the optical microscope; swelling properties of the micelle strings of the different celluloses in NaOH during mercerization; the effect on them of hydrolysis with hot dilute acid; the colloidal properties of cellulose micelles; the disintegration of pulps in water suspensions by ultrasonic radiation or technical beating; polymolecularity of native and depolymerized celluloses; and the similarity of algal cellulose from *Valonia* spp. and the dissimilarity of that from *Halycistis* to that from land plants.

696. Frey-Wyssling, A. Über die submikroskopische Struktur der zellulosischen Elementarfibrillen. **[The submicroscopic structure of elementary fibrils in cellulose.]** *Experimentia, Basle* 9 (5), 1953 (181). 14 refs. [G.e.] O.R.S.

The difference in diameter of elementary fibrils measured with the electron microscope or determined by X-ray analysis is explained on the assumption that they have a well crystallized interior covered by a paracrystalline peripheral layer. *From author's summary.*

813.2. Minor Organic Constituents. Extractives. Cell Contents

See also Nos. 614, 650, 705.

697. Berkel, A., and Huş, S. Turkiye çam türlerinden sarıçam (*Pinus silvestris*) ve fıstık çamı (*Pinus pinea*) gövde odunu içerisindeki ham terebantin miktarları ve yayılışı hakkında araştırmalar. **[The resin content of stem wood from the Turkish Pines, *P. sylvestris* and *P. pinea*.]** *Istanbul Üniv. Orm. Fak. Derg.* 2*A* (2), 1952 (3–18). 8 refs. [Turk.g.]

Samples were taken from sapwood and heartwood at different heights in the stem of 3 trees of each

species and resin was extracted from wood meal with alcohol. Figures showing the maximum and minimum resin contents, the average for sapwood and heartwood separately and the average for the whole stem in these two species and in *P. halepensis* var. *brutia* and *P. nigra* var. *caramanica* [cf. *For. Abstr.* 13 (No. 4216)] are tabulated. The average resin contents for *P. sylvestris* were 4·19% for the sapwood, 9·17% for the heartwood and 6·8% for the whole stem, and for *P. pinea* 3·47, 14·16 and 7·75% respectively. In all 4 species no significance could be found in variations horizontally in the sapwood; variations horizontally in the heartwood were rather more distinct. In the sapwood, resin content was roughly the same for all heights; no regular variation with height was found for heartwood of *P. h. brutia* or *P. n. caramanica* but for the other two species a regular decrease in resin content of the heartwood occurred from butt to top. *From authors' summary.*

698. THOMPSON, J. O., BECHER, J. J., and WISE, L. E. **A physicochemical study of a water-soluble polysaccharide from Douglas Fir (*Pseudotsuga taxifolia*.)** *Tappi* 36 (7), 1953 (319–24). 23 refs. P.R.

Mild cold-water extraction of the heartwood of a 107-year-old Douglas Fir yielded a polysaccharide system in which chromatography revealed the presence of galactose, arabinose, xylose, and traces of acidic material. Osmotic-pressure measurements of the aqueous solution indicated an average degree of polymerization of 340. Hot-water treatment of the residue after cold-water extraction, removed appreciable amounts of carbohydrates, including glucose and mannose. While the pH of the cold-water extract was 7, that of the hot-water extract was ca. 3.

699. **Wood starches [: *Eucalyptus obliqua*].** *Rep. For. Prod. Res. Bd., Lond. 1952*, 1953 (39–40).

Describes the method used in isolating the starch, a modification of that used in preparing starch from Elm sapwood. [Cf. *For. Abstr.* 13 (No. 2447).]

700. CARRUTHERS, W. R., and FARMER, R. H. **Extraction of baikiain from 'Rhodesian Teak'.** *Chem. & Ind.* 1953 (26), (641). 3 refs. P.R.

Describes a method of extracting baikiain from the wood of *Baikiaea plurijuga*.

701. FREUDENBERG, K., and HARTMANN, L. Inhaltsstoffe aus *Robinia pseudoacacia*. **[Constituents of *R. pseudoacacia*.]** *Naturwissenschaften* 40 (15), 1953 (413). 3 refs. [G.] [Universität, Göttingen.] O.R.S.

The wood was found to contain 4% of a substance, dihydro-robinetin, which inhibited the growth of wood-destroying fungi, e.g. *Poria vaporaria* and *Coniophora cerebella*. Glycosides were found in the leaves, but not in the heartwood.

702. ENGELMANN, E., and RAUER, E. Über die Gewinnung eines neuen Sesquiterpenalkohols (Animol) aus dem Öl des Holzes *Myoporum crassifolium* (Animeöl). **[A new sesquiterpene alcohol, animol, from the oil (anime oil) from the wood of *M. crassifolium*.]** *Naturwissenschaften* 40 (13), 1953 (363). [G.] O.R.S.

813.3 Ash Constituents

703. KEDARE, B. S., and TENDOLKAR, G. S. **Ash analysis of some hardwood species of the State of Bombay.** *J. sci. industr. Res., India* 12*B* (3), 1953 (125–6). 7 refs. D.S.I.R.

Tabulates the results of the analysis of ash of 25 species from the State of Bombay. Botanical and local names are given.

813.5. Reaction with Metals

704. **Electrochemical attack on boat timbers.** *Rep. For. Prod. Res. Bd., Lond. 1952*, 1953 (42–6).

The primary cause of a localized softening round metal fastenings in boat timbers is thought to be the presence of dissimilar metals in contact with wet wood, the metals forming the poles of a galvanic cell and the moisture in the wood the electrolyte solution; conditions are particularly favourable when the wood contains moisture in which an inorganic salt is dissolved, as with sea water. Simple experiments were set up in which two dissimilar metals were embedded in pieces of wood (several species of hardwoods and softwoods, and blocks of compressed pure cellulose being used) moistened with salt solutions, and connected externally by a wire. It was found that the results resembled very closely conditions found in boat timbers; alkaline conditions developed rapidly round the cathode and, with iron, acid conditions rather later round the anode. Anodes of other metals have still to be examined. An examination of the Teak hull of the *Cutty Sark* showed numerous localized areas of strong acidity (HCl) and strong alkalinity (NaOH and Na_2CO_3) inside the hull above and below the water-line, with very extensive breakdown of the wood in these regions. It was possible at a point slightly above the water-line to measure a potential difference of 25 to 40 millivolts between an iron plate and a bronze bolt not in direct metallic contact, indicating that electrochemical action through the moisture of the wood was still proceeding. Examination of a number of newer vessels gave similar results. The Zn in the coating of galvanized iron is even more anodic to Cu than Fe and is rapidly attacked at points of contact with the electrolyte. Timbers of different species vary in their intrinsic resistance to alkali, and data are tabulated showing the resistance of 5 softwoods and 8 hardwoods to NaOH; the results correspond roughly to the order of resistance found in practice. As far as possible the use of dissimilar metals in boat-building should be avoided and, where they are used, insulation should be provided by the insertion of plastic, rubber, or bituminized-felt gaskets, e.g. between iron floors and timber frames at points of contact, and by coating bolts passing through hull planking or decks, with bitumen, chlorinated rubber paint etc. Particular care should be taken in the insulation of any kind of electrical apparatus, as very minute stray currents can accelerate the chemical reactions.

813.8. Poisonous and Irritant Properties

705. **Extractives of Toporite (*Hernandia sonora*).** *Rep. For. Prod. Res. Bd., Lond. 1952*, 1953 (41–3).

Results of extraction of heartwood and sapwood with ether and alcohol showed that picropodophyllin and podophyllotoxin acetates, and alkaloids are present in the wood, and an attempt is being made to discover whether the irritant properties of the wood are due to podophyllotoxin or to the alkaloid, or possibly to the resinous components.

814. *Natural Durability. Old Wood. Fossilized Wood*

See also Nos. 110, 608, 701, 843.

706. APPLEQUIST, M. B. **A study of the durability of native Louisiana fence post materials.** *LSU For. Notes La. agric. Exp. Sta.* No. 2, 1953. pp. 2.

Preliminary report on an experiment set up in 1950–51 to test, under service conditions, the natural durability of untreated fence posts of some 32 native species.

707. KOHARA, J. **[Studies on the durability of wood—I. Mechanical properties of old timbers (Horyuji Temple construction timbers, *Chamaecyparis obtusa*).]** *Scientific Reports of the Saikyo University, Kyoto: Agriculture* 2, 1952 (116–31). 13 refs. [Jap.e.] P.R.

[Cf. *For. Abstr.* 14 (No. 2656); 15 (No. 608).] Presents tabulated and graphed results of comparative tests on *C. obtusa* timber of recent origin and that taken from the 1300-year-old Horyuji temple. For moisture contents of 12–14%, the following results were obtained (the first figure refers to old timber, the second and third to 2 specimens of new timber): sp. gr. 42·2, 37·5, 35·0 lb./cu. ft.; compression strength 454, 308, 313 kg./sq. cm.; static bending strength 717, 641, 635 kg./sq. cm.; Young's modulus 9·13, 7·15, 8·51 ($\times 10^4$) kg./sq. cm.; impact bending 0·26, 0·46, 0·53 kg./sq. cm.; hardness (cross) 4·04, 3·21, 3·11, (edge) 1·10, 0·90, 0·87, (flat) 1·08, 0·81, 0·79 kg./sq. mm.; shear strength 62, 76, 67 kg./sq. cm., and cleavability 12, 17, 16 kg./cm. Old timber shows higher values of compression and static bending strength than new over a m.c. range 0–45%. The % of late wood was 7, 8, 9%; radial shrinkage 2·9, 2·6, 2·4%, tangential shrinkage 4·7, 5·6, 6·1%.

708. CHOWDHURY, K. A. **Some more fossil woods of *Glutoxylon* from South-east Asia.** *Ann. Bot.* (*n.s.*) 16 (63), 1952 (373–7 + 1 plate). 12 refs. O.R.E.

Four fossil-wood specimens from the Tertiary of south-east Asia are described and are united under one name, *Glutoxylon burmense*, although some of them have already been described under different generic and specific names. They are all allied to *Gluta*, the recent species of which are confined to south-east Asia. The fossil species, however, occur not only in Burma and Indo-China, but also in India (Bengal and Assam) about 1000 miles from their present main area. The centre of distribution appears to have shifted about 1000 miles towards the south-east.

815. *Effect of Growth Factors on Structure and Properties*

See also Nos. 625–9, 632, 640, 697, 771, 888, 898–9.

709. FOUARGE, J., and SACRÉ, E. Analyse physique, mécanique et anatomique de bois d'épicéa, *Picea abies* Karst (*P. excelsa* Link), originaires de différentes stations de la Haute Ardenne. **[Physical, mechanical and anatomical analysis of wood of *P. abies* from different sites in the Upper Ardennes.]** *Bull. Inst. agron. Gembloux* 20 (3/4), 1952 (223–92 + 7 photos). 11 refs. [F.e.] E.M.B.

Tests were carried out on mine timbers and sawlogs obtained from two forest districts in the Ardennes; the specimens were from Spruce stands on (1) mor sites (*a*) typical (*b*) moist, (*c*) dry; (2) mull sites; and (3) peat sites. The test data are set out in great detail in 48 tables. The quality of mine timbers was above the average in specimens obtained from (1) (*a*), medium in specimens from (1) (*b*) and (1) (*c*), poor in specimens from (2) and (3). Sawtimber from (1) (*a*), (*b*), and (*c*) was of medium quality and that from (2) and (3) was poor.

710. MELEHOV, I. S. Značenie tipov lesov i lesorastiteljnyh uslovïï v izučenii stroenija drevesiny i ee fiziko-mehaničeskih svoïstv. **[The significance of forest type and forest growth conditions in research on wood structure and the physical and mechanical properties of wood.]** *Trud. Inst. Les.* 4, 1949 (11–20). 22 refs. [Russ.]

Lists 22 Soviet papers on the physical and mechanical properties of wood, in which the effect of the forest type or of growth conditions is taken into consideration. The results obtained are diverse and do not lend themselves to generalization. The need for systematic research in this direction is stressed. As far as the effect of forest type is concerned, the greatest stocks of high-quality Pine in the regions of the north and central *taiga* are found in the *Pinetum cladinosum*. The late-wood/early-wood ratio depends, other things being equal, on the forest type, and so does the mechanical strength of the wood; great differences can also be found in the microscopic wood structure. Besides the soil and climate, the following factors are important: (1) stand composition; (2) 'form' of the stand (i.e. the presence or otherwise of understoreys, their nature, and mutual relationships); (3) age and age structure; and (4) stand density.

711. KALNINJŠ, A. I. Svjazj svoïstv drevesiny s uslovijami proizrastanija. **[The relationship between wood properties and site conditions.]** *Trud. Inst. Les.* 4, 1949 (98–101). 2 refs. [Russ.]

Tabulates the average values of the following properties for *Pinus sylvestris* growing in Latvia: number of growth-rings/cm.; % of late wood; density and mechanical strength (compression $\perp$ and $\parallel$, static bending, tension $\parallel$). The results, based on ca. 100,000 measurements, are classified for 6 associations—(1) *Pinetum myrtillosum* with Spruce; (2) *P. lycopodiosum*; (3) *P. vacciniosum*; (4) *P. cladinosum* and *P. callunosum*; (5) *P. ledosum*; and (6) *P. sphagnosum*—and different site qualities. The number of growth-rings was lowest (5·2/cm.) in (1) of site quality I, and highest (20·1/cm.) in (6) of site quality V. The % of late wood varied from 25·1 % [(5), site quality V] to 45·5% [(4), site quality III], and the sp. gr. [air-dry?] from 0·46 [(5), site quality V] to 0·47 [(2) and (4), site quality III].

712. Solncev, A. A. Vlijanie uslovii proizrastanija na fiziko-mehaničeskie svoïstva drevesiny sosny Sibiri. **[Effect of site conditions on the physical and mechanical properties of [Scots] Pine wood from Siberia.]** *Trud. Inst. Les.* 4, 1949 (132–40). 4 refs. [Russ.russ.]

Physical and mechanical properties of the wood of *Pinus sylvestris* vary with the conditions of growth, the greatest differences being observed in the extreme forest types: *Pinetum herbosum* (2nd site class) and *P. polytrichosum* (4th site class). Age, within the interval 100–200 years, has no effect on these properties. They vary along the radius and with height of the stem; in *P. herbosum* (2nd class) the compression strength decreases by 1% per m. (from butt to top), in *P. vacciniosum* (3rd class) by 1·3%, and in *P. polytrichosum* (4th class), by 2%. The differences between the wood of Pine in Europe and in Siberia are very slight. *From author's summary.*

713. Vihrov, V. E. Makroskopičeskoe stroenie i fiziko-mehaničeskie svoïstva drevesiny duba v svjazi s uslovijami rosta. **[Macroscopic structure and physical and mechanical properties of Oak wood in relation to conditions of growth.]** *Trud. Inst. Les.* 4, 1949 (108–31). 11 refs. [Russ.]

Presents the results of studies of 21 sample *Quercus robur* (ca. 60–70 years old) felled in 1946 in 3 plots in the Tellerman experimental forest near the river Khoper. The 3 associations involved were: *Quercetum salinum* (I), *Q. fontinale* (II), and *Fraxineto-Quercetum caricoso-aegopodiosum* (III). The width of growth rings and of late wood, as well as the % of late wood, were much higher for Oaks from II and III than from I. The number/cm. of large rays decreased markedly with height for I, while remaining almost constant for II and III. The strength/density ratios show that, for compression ||, static bending, and impact bending, Oak from I is inferior to Oak from II and III, but Oak from all 3 sites of the experimental forest is in nearly all respects superior to the average Pedunculate Oak of Russia in Europe. Oak from III has the greatest density, that from I the lowest. Tables showing the variation of physical and mechanical properties with radius and height are appended for Oaks of the 3 associations.

82. CONVERSION, SHAPING, ASSEMBLY AND FINISHING OF WOOD: GENERAL

714. Kivimaa, E. Mitä on puuntyöstöterien tylsyminen. **[What is the dulling of woodworking tools.]** *Tied. Valt. tekn. Tutkimusl.* No. 106, 1952. pp. 19. 2 refs. [Fi.e.] P.R.

[Cf. *For. Abstr.* 14 (No. 3774).] There is a full English summary, and legends to graphs and diagrams have English text.

821. *Barking*

See also Nos. 326–7, 796.

715. Hill, L. E. **Hydraulic barking.** *Wood Working Digest* 55 (4), 1953 (63–8, 70, 72–4). P.R.

An illustrated description of hydraulic barkers of different types in use in the pulp mills of the Pacific Northwest.

822. *Saws and Sawing*

See also Nos. 312, 328.

716. **Sawing studies.** *Rep. For. Prod. Res. Bd., Lond. 1952*, 1953 (25).

The siliceous timber Makoré [*Mimusops heckelii*] was used in comparative tests, with circular saws, of the performance of 3 types of inserted tooth: standard, treated, and tipped with Stellite. The basis of comparison was the output attainable for % increase in the power requirements of the saw, as this factor indicates specific degrees of blunting. The tests were made in normal conditions at a fixed feed speed of 40 ft./min. Precision methods were employed to obtain concentricity of the tooth tips so that all teeth were in cut, and shared almost equally in the work. As an example of the performance, for a 25% increase in power, the output from the saw when fitted with standard, treated and stellited teeth was 8, 56, and 3000 linear ft. respectively of 2-in. stock. The edge-life travel in the wood per tooth was, for the 3 types, 52, 400 and 19,400 ft. respectively. Practical tests carried out previously in rather unfavourable conditions in a colonial sawmill had given outputs from standard and Stellite tips in the ratio of about 1:10. The benefit derived from tipping the teeth depends largely upon care taken in preparation and use of the saw.

717. **[Tests of *Parinari holstii*.]** *Rep. For. Dep. Uganda 1952*, 1953 (18).

General tests have been completed at Princes Risborough on Mubura (*Parinari holstii*), a timber with a very high SiO_2 content. Stellite-tipped saws cut the wood well, but teeth often broke off when they struck a concretion or 'stone'. Experiments are now to be made with high-speed steel teeth.

718. Wertz, B., and Hrycyk, R. Zużycie mocy przez trak przy przecieraniu drewna sosnowego. **[Power consumption in a vertical frame saw during conversion of Pine logs.]** *Sylwan* 97 (1), 1953 (58–65). [Pol.]

The tabulated and graphed results of measurements made with a high-speed frame-saw (continuous feed, stroke 550 mm., inside width of frame 650 mm., kerf width 3·5 mm., long diam. 13·5–46·5 cm., moisture content 28–35%) show a considerable correlation (coefficient 0·9) between the power consumption and the total area of the cut for a single revolution of the spindle at a constant kerf width of 3·5 mm. The results are analysed, using formulae developed by Russian authors, and compared with similar Russian results.

719. Endersby, H. J. **The performance of circular plate ripsaws.** *Bull. For. Prod. Res., Lond.* No. 27, 1953. pp. 20 + 7 photos. 4 refs.

The performance of circular plate ripsaws has been related to (1) feed speed, (2) depth of cut, (3) hook angle, (4) number of teeth on the saw, and (5) density of timber cut. Particular attention was paid to saws having relatively few teeth, and evidence was obtained indicating that their use depended on suitable operating conditions. The behaviour of sawdust in the vicinity of the gullet was studied with the aid of high-speed photography, and an attempt was

made to correlate the amount of sawdust retained in the gullet to particle size. *Author's summary.*

720. SKJELMERUD, H. **Sawblades with swage-set and spring-set teeth.** *Transl. Commonw. sci. industr. Res. Organ. Aust.* No. 1881, 1952. pp. 18 + 2 photos + 4 drawings + 1 gph. 5 refs. Transl. by P. A. Gibson from *Norsk Skogind.* 6 (4), 1953 (113–21). [Cf. *For. Abstr.* 14 (No. 679).] Limited distribution.

721. ANDRIEVSKIĬ, A. I. **The TsNIIME universal sharpening and jointing machine.** *Transl. Commonw. sci. industr. Res. Organ. Aust.* No. 1789, 1952. pp. 5. Transl. by M. Slade from *Lesn. Prom.* 11 (9), 1951 (15–7). [Cf. *For. Abstr.* 14 (No. 2675).] Limited distribution. P.R.

823. *Planing, Cutting of Mouldings. Chiselling, Mortising and Tenoning. Boring. Turning*

722. PATRONSKY, L. A. **Knife cutting problems.** *J. For. Prod. Res. Soc.* 3 (2), 1953 (15–9). 6 refs. I.F.B.

Problems discussed include: machining end grain; mechanics of chip formation; cutting velocity; and tool design and maintenance.

723. GRAY, R. F. **Knife marks per inch.** *J. For. Prod. Res. Soc.* 3 (2), 1953 (13–4, 85). I.F.B.

Suggests and discusses the implications of establishing a standard determined by the minimum number of cutter-head knife marks/inch to produce an acceptable finish for a given product.

724. LIPKA, W. Turbo-Abrichter—eine neue Holzbearbeitungs- und Zerspanungsmaschine. **[The turbo smoothing planer—a new woodworking and chipping machine.]** *Holztechnik* 32 (1), 1952 (10–2). [G.] P.R.

Illustrated description of a new machine embodying a plate-like light-metal disk (the turbo runner) used as the tool holder instead of the usual cutter block spindle. This feature enables small knives with hard-metal tips to be used. The fixing and removal of the knives is effected quickly without the use of spanners, and they are easily sharpened; the danger of kickback is claimed to be completely eliminated. The cutting speeds, kinetic energies, and momenta of the Turbo smoothing planer are, for a given motor speed, ca. 3–5 times those of a conventional smoothing planer. Other advantages claimed include horizontal cut, even surface, automatic removal of chips, silent running, and low power requirements.

725. LIPKA, W. **The turbo smoothing planer, a new woodworking and chipping machine.** *Transl. Commonw. sci. industr. Res. Organ. Aust.* No. 1756, 1952. pp. 4 + 3 photos. Transl. by P. A. Gibson from *Holztechnik* 32 (1), 1952 (10–2). Limited distribution. P.R.

824. *Forms of Joint. Jointing and Assembly*

824.1. Nailed Joints

726. MÖLLER, T. **New method of estimating the bearing strength of nailed connections.** *Transl. Commonw. sci. industr. Res. Organ. Aust.* No. 1839, 1952. pp. 26. Transl. by H. E. Kijlstra and R. G. Pearson from *Handlingar, Chalmers Tekniska Högskola, Göteborg* No. 117, 1951. (Tables and figures not included.) Limited distribution. P.R. [Cf. *For. Abstr.* 13 No. (4248).]

824.8. Glues and Gluing

See also Nos. 312, 752–4, 811.

727. ***Adhesives & Resins.*** A. S. O'Connor & Co. Ltd., London. Monthly. Price 30*s.* p.a.; 2*s.* 6*d.* per copy. P.R.

Vol. I, No. 1, for April, 1953, contains some 20 pages. Citation in *For. Abstr.: Adhesives & Resins.*

728. HYLER, J. E. **Glues and gluing Parts 1–13.** *Sth. Lumberm.* 185 (2318; 2321), 1952 (41 . . . 52, 56–7; 281 . . . 286); 186 (2322–2332), 1953 (55–8; 54–60; 55 . . . 60; 71–4; 49–52; 69–72; 55 . . . 57; 81 . . . 84; 43–6; 63 . . . 66; 57 . . . 60).

Discusses the glues used and methods of manufacture in plywood, moulded products and hardboards, and the development, preparation, gluing methods, performance and uses of animal and vegetable glues.

729. HIRAI, S., and SATO, J. **Studies on plywoods. VIII. The effect of the drying process on the adhesive strength of casein plywood.** *Wood Industry* [, *Japan*] 7, 1952 (220–3). From *abstr.* in *Rec. Res. Fac. Agric. Univ. Tokyo* No. 2, 1951/52 (1953), (76). [E.] [Cf. *For. Abstr.* 14 (No. 2732).] (1) Adhesive strength is at its maximum value at 10% moisture content, whatever the drying temperature. The maximum value increases with increasing drying temperature. (2) The lower adhesive strength due to excessive drying below 10% m.c. almost recovers after absorption of water for a short time but the maximum value in absorption is lower than in drying. (3) The adhesive strength and water-resistance of plywoods are improved by drying at 80 and 100° C., while drying at 40 and 60° has no effect. The water resistance of plywood dried for over 1 hour at a high temperature tends to be lower than when it is dried more gently.

730. HIRAI, S., and SAITO, J. **Studies on plywoods. IX. The changes [caused in] some physical properties of casein glue by heat treatment.** *Wood Industry* [, *Japan*] 7, 1952 (266–7). From *abstr.* in *Rec. Res. Fac. Agric. Univ. Tokyo* No. 2, 1951/52 (1953), (71–2). [E.]

Cf. *For. Abstr.* 14 (No. 2732).

731. NAKATSUKA, T. **The relations between time, temperature of alkali-cellulose ageing and joint strength of viscose adhesive.** *J. Jap. For. Soc.* 33, 1951 (341–2). From *abstr.* in *Rec. Res. Fac. Agric. Univ. Tokyo* No. 2, 1951/52 (1953), (78). [E.]

The relationship can be expressed by the following formula: $\log F = \log a - 0{\cdot}4343\, p\theta^q t$ where F is joint strength of the adhesive, t and θ are time and temperature of alkali-cellulose ageing respectively and a, p, and q empirical constants. [Cf. *For. Abstr.* 14 (No. 2689).]

732. NAKATSUKA, T. **Ripening of viscose adhesive. I. The influence of temperature and time of**

viscose ripening on the properties of the adhesive. II. The influence of the addition of alcohols and other chemicals on the ripening and joint strength of the adhesive. III. The syneresis of viscose gel. *J. Jap. For. Soc.* 33, 1951 (334–6; 397–400; 411–2). From *abstr.* in *Rec. Res. Fac. Agric. Univ. Tokyo* No. 2, 1951/52 (1953), (78–9). [E.]

733. BRANDTS, T. G. **Mangrove tannin formaldehyde resins as hot-press plywood adhesives.** *Commun. For. Res. Inst., Bogor* No. 37, 1953. pp. 14. [E.e.] *Repr.* from *Tectona* 42, 1953 (137–50).

Adhesives prepared with tannins from *Rhizophora apiculata, R. mucronata* and *Bruguiera gymnorrhiza* barks have reasonable working lives, and set at 140° C. to form water-resistant plywood bonds. *R. stylosa, B. caryophylloides*, and *B. parviflora* tannins also give satisfactory bonds, but their working life is too short or their pressing time too long for practical use.

734. HAFNER, T. Hochfrequenzerwärmung von nichtleitenden Stoffen unter besonderer Berücksichtigung der Holzindustrie. **[R.F. heating of non-conductors with particular reference to timber industry.]** [*Publication*] *Brown Boveri & Cie, Baden, Switzerland* No. 2243*D*, [1951?] (1–2). [G.] P.R.

Brief discussion of the principles and suitability of wood heating and seasoning with the aid of R.F.

735. RUNTE (LEE), E. Heissverleimung von Holz mit Hilfe von Hochfrequenzwärme. **[Hot-gluing of wood with the aid of R.F. heating.]** [*Publication*] *Brown Boveri & Cie, Baden, Switzerland* No. 2243*D*, [1951?] (3–8). 6 refs. [G.] P.R.

Discusses the application of R.F. heating for the curing of synthetic-resin glues and binders, using transverse and longitudinal R.F. fields. Describes in more detail the manufacture of curved chair backs from plywood, of blockboards (*Tischlerplatten*) and wallboards, and the characterististics of the Brown-Boveri R.F. generator of 25 KW. output.

825. *Cleaving. Adzing. Mechanical Comminution*

See Nos. 312, 796.

826. *Peeling, Slicing, Trimming, Edging etc. of Thin Sheets*

See Nos. 758–61.

827. *Bending. Moulding (other than by Cutting)*

See also No. 766.

736. KIVIMAA, E. **The bending of Birch.** *Tied. Valt. tekn. Tutkimusl.* No. 54, 1948. pp. 36. 14 refs. [E.]

An English version of a report in Finnish. [See *For. Abstr.* 11 (No. 1198).]

737. **Wood bending.** *Rep. For. Prod. Res. Bd., Lond. 1952*, 1953 (14–5).

Nine timbers tested included Kokrodua [*Afromosia* sp.], Brown Sterculia [*S. rhinopetala*] and Courbaril [*Hymenaea courbaril*]. None was equivalent to Beech, but Courbaril was the most promising and appeared suitable for certain furniture bends. A large-scale series of tests on Ash from Selsey Forest, Northants, showed that the material possessed very good bending properties but that much would be unsuitable for bending because of the prevalence of small knots. In laminated bending, the direction of growth rings relative to the axis of curvature had a negligible effect in ring-porous hardwoods, but with softwoods best results were obtained when the growth rings were normal to this axis.

738. MILLER, D. G. **Curved plywood, its production and application in the furniture industry.** *J. For. Prod. Res. Soc.* 3 (2), 1953 (22–6). I.F.B.

Discusses different methods of bending, and describes with illustrations a machine developed at the Forest Products Laboratory, Ottawa, in which glued veneers are placed on a pressure band, bent on a curved form and bonded by dielectric heating.

829.1. *Finishing*

See also Nos. 788, 794.

739. LÜTHGENS, M. Maschinen und Geräte für die Oberflächenbehandlung von Holz. **[Machines and tools for the surface treatment of wood.]** *Holz Roh- u. Werkstoff* 11 (6), 1953 (212–5). 7 refs. [G.g.] P.R.

Describes several new machines and tools recently introduced into the German furniture and allied industries, in particular the hot-spray coating apparatus, wet grinding and polishing machines, and machine tools.

740. ADOLF BUDDENBERG, G.M.B.H. Verfahren zur Oberflächenveredelung von Holz, insbesondere von Furnieren und Sperrholz. **[Method of surface improvement of wood, in particular veneer and plywood.]** *German Patent* No. 827,710, Jan. 14, 1952. pp. 2. P.O.

The material is passed between two rollers, at least one of which is heated above the flash point of the wood, so that the wood extractives (phenols etc.) accumulate in the surface layer.

83. TIMBER MANUFACTURING INDUSTRIES AND PRODUCTS. USES OF WOOD AS SUCH

831. *Fuelwood and Various Types of Rough Timber*

See also Nos. 584, 675, 706, 818–28.

741. ALEXANDER, J. B. **Wood piles—specifications and mechanics.** *J. For. Prod. Res. Soc.* 3 (2), 1953 (62–4). [Forest Products Laboratory, Vancouver.] I.F.B.

Discusses the various specifications for piles current in N. America, strength properties of some of the species generally used, pile design, and the forces and loads to which piles may be subjected in service.

742. KOTOK, E. S. **Ponderosa Pine—a good pole wood.** *Res. Note Sthwest. For. Range Exp. Sta.* No. 123, 1953. pp. 4. 4 refs.

Gives details of the durability, treatability, strength, serviceability, seasoning properties, weight and texture of Ponderosa Pine as compared with Southern Pine and Douglas Fir.

743. **Housing specification (interim series) for timber clothes-line posts.** *Inter. Specif. Stand. Ass. Aust.* No. SAA Int. 316, 1949. pp. 6. 1 ref. Price 2*s*. P.R.

744. **Specification for cross ties (reapproved with revisions 1952). Specifications for machining cross ties. 1936. Specification for switch ties (reapproved with revisions 1952).** American Railway Engineering Association, [Chicago] and Association of American Railroads. 1952. pp. 14. 3 refs. P.R.

745. BENIĆ, R. Iskorišćenje oblovine kod izrade tesanih i piljenih željezničkih pragova i tesane i piljene skretničke i mostovne građe. **[Utilization of roundwood for hewn and sawn sleepers, crossing-sleepers and bridge timber.]** *Šum. List* 77 (3), 1953 (127–36). [Croat.e.]

Gives tables for the utilization % of logs of *Fagus sylvatica*, *Quercus cerris*, *Quercus robur*, and softwood converted (hewn) into railway sleepers of different dimensions, using different methods of breaking down the log. The sleeper dimensions are those of a recent Jugoslav Standard. The utilization % for the conversion (hewing and sawing) of roundwood into crossing sleepers and bridge timber is also tabulated for two cross-sections and different sapwood dimensions.

832. *Mills, Their Functions and Products*

746. KOCH, H. Absaugungsanlagen an Holzbearbeitungsmaschinen. **[Suction plants for wood-working machines.]** *Holz Roh- u. Werkstoff* 11 (6), 1953 (223–5). 2 refs. [G.g.] P.R.

Discusses the technical performance requirements of suction plants, the effect of suction-funnel shape on the air-speed distribution, and the possible faults in the suction system. A table of required air velocities and quantities is reproduced from publications of the USA Committee on Industrial Ventilation.

832.1. Sawmills and Planing Mills

See also Nos. 716 *et seq.*, 745, 795–7.

747. HANGER, M. R. **Electric energy use in Western Pine sawmills.** *Timberman* 54 (11), 1953 (68 . . . 76).

Gives data from a survey comparable to that for primary mills in the Douglas Fir region. [Cf. *For. Abstr.* 14 (No. 3802).]

748. GILBERT, T. J., and MCDONNOUGH, J. **Take the 'hand' out of lumber handling.** *J. For. Prod. Res. Soc.* 3 (1), 1953 (56–60). P.R.

Describes mechanical equipment for use in timber mills.

749. FORSBERG, P., and THUNELL, B. Undersökning av utbytet vid topp- och rotsågning genom provsågningar utförda vid två sågverk sommaren 1950. **[An investigation on top and butt sawing by test sawings carried out in two sawmills during the summer of 1950.]** *Medd. svenska TräforsknInst. (Trätekn. Avd.)* No. 30*B*, 1952. pp. 46 + 4 photos + many dgms., gphs., tbls. [Sw.] P.R.

Test sawings were carried out in two gang-saw mills, one normally sawing with the butt end, and the other with the top end first. Logs were sorted into top diameters 6, 8, 10 and 12 in., and 300 logs of each dimensions were sawn by each method. In each mill, sawing by the unfamiliar method reduced the yield of sawn timber, by 2·3% in the change to top end first and by only 1·7% for butt end first, but the reductions in quality of sawn timber obtained with the latter largely offset the 0·6% difference between the 2 methods; there was a corresponding increase in the yield of chips from slabs and edgings, and of sawdust when the unfamiliar method was used. It is concluded that there is little difference in yield between the two methods. Before sawing, total volumes of the logs were estimated by methods based on mid-diameter, top-butt diameter and floating volume according to the Ångermanälv volume tables. The three methods gave similar results for the smaller logs, but considerable differences for the larges ones. Mid-diameter measurements gave volumes closest to the total timber volume actually obtained and, like the floating volume, rather below it, while the top-butt diameter measurements gave volumes above those obtained for the 10- and 12-in. logs.

750. MATSON, E. E. **Lumber grades from Douglas Fir peeler logs.** *Res. Note Pacif. Nthwest. For. Range Exp. Sta.* No. 83, 1952. pp. 5.

Gives figures in tables and graphs showing lumber grade recovery from grades 1, 2 and 3, based on recovery studies at mills in the Eugene area, Coos Bay area and in southern Oregon.

751. **[Recovery of building timber from *Brachystegia longifolia* logs.]** *Rep. For. Dep. N. Rhod. 1952*, 1953 (7).

Logs with a total volume of 8323 cu. ft. yielded a 53% recovery of sawn timber, mainly 4½ in. × 1½ in. × 20 ft. average length. After 5 months' seasoning, 27% of the timber was straight and good, 42% warped but usable, and 31% unmarketable.

832.2. Veneer and Plywood Mills, including the Manufacture of Composite-Wood Assemblies

See also Nos. 727–35, 737–8, 740, 770–1.

752. **Trials of timber for plywood manufacture. Progress report 17. Preliminary report on six African species.** Forest Products Research Laboratory, Princes Risborough. 1952. pp. 28. P.R.

Results of tests on *Berlinia* spp., *Sterculia rhinopetala*, *Afrormosia* spp., *Bombax rhodognaphthalon*, *Pterygota kamerunensis*, and *Sterculia oblonga*.

753. **Trials of timbers for plywood manufacture. Progress Report 20. Consignment No. 742 Sapele (*Entandrophragma cylindricum*).** Forest Products Research Laboratory, Princes Risborough. 1953. pp. 13.

Gives data on processing trials, gluing properties and veneer quality. [Cf. *For. Abstr.* 13 (Nos. 2502–3, 4283), 14 (No. 1578).]

754. **Trials of timber for plywood manufacture. Progress report 21. Small scale tests on: Consignment 750, Scots Pine; Consignment 763, Sitka Spruce.** Forest Products Research Laboratory, Princes Risborough. 1953. pp. 11.

Gives data on processing trials, gluing properties and veneer quality.

755. Régnier, R. Importance des dégâts de la mineuse du cambium du peuplier pour l'industrie du déroulage. **[The importance to the veneer industry of damage by a cambium borer in Poplar.]** *Trans. 9th int. Congr. Ent., Amsterdam 1951* 1, 1952 (711–4). 7 refs. [F.e.] I.I.E.

Poplar veneers used in making cheese boxes must be of good quality, especially for the encircling bands, which are 40–50 cm. long and only 0·8 mm. thick. Among defects most frequently weakening the wood so that it is useless for this purpose are tunnels made in the cambial zone by larvae of one of the Agromyzidae, probably related to *Dendromyza* (*Dizygomyza*) causing damage to Willows in Austria. In some plantations damage, which cannot easily be detected until the bark is removed, was found in over 50% of the trees. In the factory the logs should be carefully inspected before peeling and if there are traces of tunnels, should be used for thicker veneers. It might be possible to control damage in the plantations by treating soil at the base of the trees, where pupation probably takes place, with BHC.

756. Saks, E. V. **Storage, boiling, and steaming of veneer logs.** *Sth. Lumberm.* 187 (2335), 1953 (60 . . . 70).

757. **Putting logs in cooler aids veneer production.** *Wood, Chicago* 58 (5), 1953 (36). P.R.

Describes a cooling room used for summer storing of Basswood logs before veneer cutting; the optimum temperature for this operation has been found to be reasonably below 40° F.

758. Perry, T. D. **Veneer and plywood machinery. Part 2. Veneer lathes and reeling equipment.** *Wood Working Digest* 55 (4), 1953 (121–4, 126, 128–32). P.R.

An illustrated description of modern veneer lathes, secondary lathes for cores, lathes for packaging veneers, and reeling units.

759. Perry, T. D. **Veneer and plywood machinery. Part 3. Veneers slicers and segment saws.** *Wood Working Digest* 55 (5), 1953 (121–4, 126, 128, 130, 132–3). P.R.

Illustrated description of the design and operation of several types of veneer slicers and segment saws for veneer cutting.

760. Kollmann, F., and Geschwandtner, H. Betriebsmessungen an Furnierschälmaschinen. **[Service measurements on veneer peeling machines.]** *Holz Roh- u. Werkstoff* 11 (5), 1953 (182–90). 6 refs. [G.g.] P.R.

Presents graphed and tabulated results of measurements in 6 German veneer plants on the relationships between power consumption and the factors: number of revolutions (angular speed), cutting speed, log length, veneer thickness, cutting angle, compression of wood (nose-bar adjustment), pretreatment of logs, species, type of driving gear, and speed control. Discusses the effect on veneer quality of the adjustment of the peeling machine [cf. *For. Abstr.* 12 (No. 464)]. The power consumption required varies with local conditions. During the peeling process, consumption falls from an initial peak value, decreasing up to the end of the process.

761. Sacht, H.-J. Rationalisierung der Arbeit zwischen Schälmaschine und Trockner. **[Rationalization of work between the peeling machine and drier.]** *Holz Roh- u. Werkstoff* 11 (3), 1953 (96–103). 3 refs. [G.] P.R.

Discusses the problems of (1) the intermediate storing of continuous veneer sheets between the peeling machine and the clipper, and (2) the clipper itself.

762. Irschick, E. Das 'Stehvermögen' von Sperrplatten. **[The resistance of plywood sheets to warping.]** *Holz-Zbl.* 76 (93), 1950 (1017–8). [G.]

Analyses the causes of, and gives advice how to prevent, the various forms of warping in plywood sheets.

763. **Australian standard specification for waterproof plywood, marine and standard grades.** *Aust. Stand.* No. 0.59, 1952. pp. 13 + 6 photos. Price 7*s.* 6*d.* P.R.

764. **Specification for three-ply and multi-ply constructional and decorative boards.** *Specification, British Railways, London* No. 502*A*, 1952. pp. 7. P.R.

765. **Specification for three-ply and five-ply blockboard and sawn kerfed boards, plain and decorative.** *Specification, British Railways, London* No. 508*A*, 1952. pp. 6 + 1 dgm. P.R.

766. **Laminated shapes.** *Bull. Aero-Res., Duxford* No. 120, 1952. pp. 7. P.R.

Some notes on methods for producing laminated bends in wood.

767. Hirai, S., Fukui, H., and Shibahara, S. **[Studies on laminated assemblies from sawn boards. I. Preparation of a laminated assembly from *Cryptomeria japonica*.]** *Bull. Tokyo Univ. For.* No. 44, 1953 (123–38). 5 refs. [Jap.e.]

An assembly, 2000 × 100 × 175 mm., was constructed by gluing 7 flat-sawn heartwood boards 25 mm. thick with urea resin having 5% wood-flour filler. Surface roughness is illustrated. Tests on adhesive strength showed that: (1) irregular variations occurred along the length of the assembly, but no direct effect of the clamps used to apply pressure could be observed. (2) The values for adhesive strength and wood failure of surfaces sawn by bandsaw only, appeared to be higher than those for surfaces that had been finished by a fine resurfacing machine or a surface planer. (3) Adhesive strength and wood failure % were higher for one of the middle glue joints than for the outermost one; this is probably partly due to the larger amount of glue spread in the inner joint. (4) There appeared to be no difference in adhesive strength between joints made with straight-grained material and those having oblique grain with angles of 10–20°.

768. Lombardi, G. **Composite timber compression members.** *Transl. Commonw. sci. industr. Res. Organ. Aust.* No. 1572, [1952?]. pp. 8 + 6 dgms + 1 gph. Transl. by H. E. Kijlstra from *Schweizerische Bauzeitung, Zürich* 69 (22), 1951 (301–3). [Cf. *For. Abstr.* 14 (No. 718).] Limited distribution. P.R.

833. *Timber in Buildings and Engineering Structures (Manufacture and Use)*

769. VRAIN, G. Stabilité des constructions appliquée aux bois. Première partie. Statique graphique. **[Structural stability applied to timber. Pt. I. Graphic statics.]** *Ann. Inst. tech. Bâtim. Trav. publ.* 5 (52/53), 1952 (516–41). [F.] P.R.

A section of '*Manuel de la Charpente en Bois*' issued by the Centre d'Études Supérieures.

833.1. Building Components and Fittings: General

770. **'Trofdek': a new timber constructional system.** *Timb. Tr. J.* 206 (4012), 1953 (818–9).

The elements of the new system (originated by W. H. Willatts and A. H. Cornwall and produced by N. Newsum, Sons and Co., Ltd.) are standard units consisting of battens alternately spaced and joined by plywood webs to form a series of troughs. The construction is illustrated with a diagram and photographs. It weighs less than 2 lb./sq. ft., can be loaded with over 300 lb./sq. ft. over 12-ft. spans before failure occurs, and is rigid so that units of 100 sq. ft. or more can easily be handled by 2 men. Width of units is standardized in multiples of 8 in. and thus adaptable to various modules (2 ft., 40 in., 4 ft. etc.), length is determined by floor or roof spans or height of walls, and depth is normally $\frac{1}{24}$ of span but varies with span and loading requirements. Plywood used is 4-mm. exterior grade, phenol-bonded to Ax. 100 specification A/B quality with the A face on the underside of the unit. Softwood used is equal to or better than the requirements for stress-graded structural timber. Plywood and softwood are jointed with gap-filling glue to A 100 specification. Nails are also used. Timber content works out at 0·328 cu. ft./sq. yd. Any type of cladding, decking, covering, boarding or lining can be applied directly to either side of the units.

771. **The structural use of timber.** *Rep. For. Prod. Res. Bd., Lond. 1952*, 1953 (16–7).

Reports tests on various trusses and a box beam. A large industrial truss spar 59 ft. 2 in. between intersection points using toothed shear connectors, of mixed Douglas Fir, Spruce, Silver Fir and Baltic Redwood, failed at 13·5 tons, as against 9·9 tons for a similar beam tested earlier, which had members not conforming with the grade specified. A 46-ft.-span truss with split-ring shear connectors failed at 13·7 tons. In tests on glued joints in trusses of 19 ft. $10\frac{3}{4}$ in. span, pitch 30°, a casein-joined truss carried 7·9 tons without failure, while a matched connector-jointed truss failed at 6·4 tons; the glued truss was nearly 50% stiffer than the other and had a recovery of deflection exceeding 90% at working loads. A box beam 40 ft. × 24 in. × $6\frac{1}{2}$ in., with top and bottom flanges of three lengths of clear Douglas Fir (cross section 6 × $2\frac{3}{4}$ in.) scarf-jointed to give a 40-ft. length, vertical stiffeners, and 6-mm. Gaboon plywood covering each side of the box beam, carried a load of 17·1 tons without sign of failure, and the recovery of the beam on removal of load was over 95%.

Grading and strength tests on Sitka Spruce from Scotland and from Kent showed that the latter was considerably denser than, and superior in most strength properties to, that from Scotland; its bending strength was, however, only slightly higher as a result mainly of bigger defects, especially knots, although these were within the limits of the grades in question.

772. **Walls and partitions of blocks and slabs.** *British Standard Code of Practice, London* No. *CP* 122, 1952. pp. 109. Price 9*s*. P.R.

Includes sections on wood-wool building slabs (general design considerations, work off site, and work on site).

773. **Interim specification (housing series) for wooden doors.** *Inter. Specif. Stand. Ass. Aust.* No. SAA Int. 321, 1952. pp. 10. Price 3*s*. P.R.

774. **Housing specification (interim series) for wood windows of double hung and casement types.** Standards Association of Australia, Sydney. No. SAA Int. 318, 1951. pp. 19 + 4 dgms. Price 5*s*. P.R.

775. GRATZL, A. Holzfussböden in Theorie und Praxis. **[Wooden floors in theory and practice.]** *Mitt. öst. Ges. Holzforsch.* 4 (6), 1952 (135–45). 19 refs. [G.] P.R.

Discusses the consumption of wood for flooring in Austria, Germany, and Switzerland. Enumerates the requirements for flooring woods, and describes the testing machine developed, and some of the wood tests carried out, at Princes Risborough. The usual flooring methods (strip floors, ship planking, overlay flooring, parquet flooring, wood paving bricks, decorative parquet flooring), and new developments (mosaic parquet, panels with wood veneers, lamellar strip flooring etc.) are described, and methods of laying and maintenance of floors discussed.

776. KUHLE, E. Parkettmaschinen. **[Parquet machines.]** *Holz Roh- u. Werkstoff* 11 (6), 1953 (216–23). 2 refs. [G.g.] P.R.

Analyses the successive stages of flooring-strip manufacture in Germany, and gives illustrated descriptions of the design and operation of various machines of German manufacture.

777. KUHLE, E. Entwicklungs- und Erzeugungsprobleme von Mosaikparkett. **[Development and manufacturing problems of 'mosaic' parquet.]** *Holz-Zbl.* 79 (90), 1953 (987–8). [G.]

Appraises the Swiss mosaic parquet manufactured in square panels (48 cm. side) composed of 16 small squares, each of which contains 5 wooden strips 12 × 2·4 × 1 cm., the direction of the strips in the adjacent squares being at right angles to each other. Comparison with 'solid' strip parquet is made mostly from the point of view of cost and saving of material. Briefly describes mosaic-parquet manufacture with particular reference to seasoning. Recent practice takes curves of the m.c. frequency distribution for each kiln and each seasoning batch in order to ascertain the quality of the product.

778. Fussboden aus deutscher Douglasie. **[Flooring from German-grown Douglas Fir.]** *Holz-Zbl.* 79 (5), 1953 (29). [G.]

Douglas-Fir strips are usually laid when all other work has been completed (even whitewashing, painting, paper-hanging, and all lighting installations, including the hanging of lamps); the strips are then thrice impregnated with hot linseed oil.

779. **Timber ground floor for housing.** *Design Sheet Timb. Developm. Ass.* No. 24, [*n.d.*]. pp. 1 + 1 dgm. P.R.

780. Liiri, O. Puulattiain kulutuskestävyydestä. **[The resistance to wear of timber flooring.]** *Pap. ja Puu* 35 (6), 1953 (269–72). 10 refs. [Fi.] P.R.

A review of European and American research.

781. Prange, G. F. **Factors affecting the expansion of Hard Maple flooring.** *J. For. Prod. Res. Soc.* 3 (2), 1953 (38–40). I.F.B.

Tests were made on 5 panels of Southern Yellow Pine covered with Maple (*Acer saccharum*) flooring (1) 1½ in. wide, (2) 2¼ in., (3) 3¼ in., (4) 2¼ in. and pre-bored at each joist to prevent splitting of the tongue when the nail was driven, and (5) 2¼ in. over a $\frac{3}{32}$ in. coat of cold mastic. The flooring, which had an initial moisture content of 9%, was subjected to temperatures of 138° F. and r.h. of 85%. It was measured at 3-day intervals for 15 days. Expansion increased with increasing width; no significant difference was noted between the 2¼-in. flooring with and without mastic, but pre-boring reduced the total expansion by 10%, an amount not considered significant with so small a number of panels. A modified tongue-and-groove joint, giving increased surface contact between the two strips, improved resistance to buckling.

782. Teesdale, L. V., and Mathewson, J. S. **Preventing cracks in new wood floors.** *Leafl. U.S. Dep. Agric.* No. 56 (rev.) 1952. pp. 6.

833.2. Special Uses in Residential, Commercial and Public Buildings

783. Latham, B. **Timber houses—1. Neolithic to Middle Ages. 2. The Elizabethans. 3. The twentieth century.** *Wood* 18 (6–8), 1953 (225–7; 270–2; 296–8).

833.3 Special Uses in Factories and Workplaces

See Nos. 843, 845.

833.5. Wood in Bridges, Culverts etc.

784. Maruyama, M. **[Inspection of wooden beam bridges for strength and durability.]** *Bull. Tokyo Univ. For.* No. 44, 1953 (83–106). 23 refs. [Jap.e.]

A number of bridges (mainly of *Tsuga sieboldii*) over minor forest railways, effective beam span 3–4 m., were inspected, using 3 methods of test: (1) the plunging test, in which bearing strength was calculated from the depth of penetration of a cylindrical rod; (2) test of deflection under a static load; and (3) a dynamic test of deflection under impact of a live load. Results: Using (1) the breaking strength of the member was found to be below 60% of that of sound timber when depth of penetration was over 4 mm.; strength could be judged with considerable accuracy by this method. Using (2), deflection of beams over 8 years old was near or rather above that considered to be the allowable limit, and flexural rigidity was 70% below that of newly installed timber. Comparative results showed that (3) was also an effective and practical method of measurement. *From author's summary.*

834. *Shingles. Cooperage. Packing Containers (Manufacture and Use)*

See also Nos. 660, 755, 850.

785. Borkenhagen, E. H. **Lumber grades for military packaging [: comparison of yields and costs of boxes from the different grades].** *J. For. Prod. Res. Soc.* 3 (2), 1953 (59, 89–90). I.F.B.

786. **Interim specification for crates, fully sheathed, up to 3000 lb.** *Inter. Specif. Stand. Ass. Aust.* No. SAA Int. 73, 1944. pp. 9 + 9 dgms. Price 1*s.* P.R.

787. **Interim specification for cases, wood, stitched wire.** *Inter. Specif. Stand. Ass. Aust.* No. SAA Int 76, 1944. pp. 8 + 3 dgms. Price 1*s.* P.R.

835. *Industrial and Domestic (Utility) Woodware. Toys and Models. Sports and Recreational Goods. Musical, Scientific and Mathematical Instruments. Surgical Applications etc.*

788. Rehman, M. A., and Kishen, J. **Chemical staining of Deodar pencil slats.** *Indian For.* 79 (9), 1953 (512–3).

Describes a cheap and simple method of dyeing pencil slats violet or yellow with HNO_3.

836. *Furniture and Cabinet-Making. Carving. Marquetry. Wooden Ornaments*

789. Joel, D. **Furniture timbers in relation to contemporary design. 1. What is contemporary furniture? 2. The evolution of contemporary design. 3. Some well-known woods. 4. Less usual timbers. 5. Some exotic timbers. 6. Away from severity. 7. Mixing woods. 8. Hand craftsmanship.** *Wood* 17 (7–12), 1952 (274–6; 313–5; 351–3; 394–6; 440–1; 482–3); 18 (1; 2), 1953 (24–5; 68–9).

790. Creighton, J. W., Stump, W. G., and Hutchins, W. F. **Correlation of Walnut furniture cutting requirements with grade yield.** *Quart. Bull. Mich. agric. Exp. Sta.* 35 (2), 1952 (230–47).

791. **Domestic furniture constructed mainly of wood. Part 1. Dining-type chairs.** *Brit. Stand.* No. 1960, Part 1, 1953. pp. 31. Price 5*s.* P.R.

792. **Domestic furniture constructed mainly of wood. Part 2. Cabinet goods for storage purposes.** *Brit. Stand.* No. 1960, Part 2, 1953. pp. 38. Price 5*s.* P.R.

793. **Domestic furniture constructed mainly of wood. Part 3. Tables.** *Brit. Stand.* No. 1960, Part 3, 1953. pp. 26. Price 5*s.* P.R.

839.2. *Wood Flour and its Manufacture*

794. **Bleaching wood flour [for use in the manufacture of plastics].** *Rep. For. Prod. Res. Bd., Lond. 1952*, 1953 (46).

Examination of near-white softwood sawdust showed that lack of brightness was due to the presence of a small proportion of dark particles. Experiments with gaseous bleaching agents failed to give a good permanent colour. Of liquid bleaching agents, H_2O_2 made alkaline with Na silicate gave the best results and a series of experiments was carried out to find optimum conditions and minimum amounts of H_2O_2 required.

839.8. *Industrial Waste Wood, its Processing and Uses*

See also Nos. 746, 932, 940, 943–4, 947.

795. Guernsey, F. W. **Utilization of sawmill residue in the southern coast region of British Columbia.** *Bull. For. Br. Can.* No. 109, 1953. pp. 31.

A survey of the amount of wood waste available, present utilization and possible future uses.

796. Bell, G. E. **The use of sawmill waste for pulp in Eastern Canada.** *Bull. For. Br. Can.* No. 108, 1953. pp. 48.

Consists mainly of notes (illustrated) on various types of barker and chipper suitable for use on slabs and edgings and destined for pulp manufacture, and methods of transporting waste.

797. Knauss, A. C. **Utilization of mill residues in the timber products mills of the Lakeview working circle [Oregon].** *Res. Pap. Pacif. Nthwest. For. Range Exp. Sta.* No. 6, 1953. pp. 14. 1 ref.

Gives figures for production and actual utilization of wood waste from 4 sawmills and 3 remanufacturing plants, and discusses potential uses.

798. Egund, K. F. Brikettering av træaffald. **[Briquetting wood waste.]** *Træindustrien* 3 (7), 1953 (73–80). 24 refs. [Dan.] Also in *Norsk Skogind.* 7 (7), 1953 (231–8). [Dan.e.]

Discusses data, drawn mainly from Danish and American experience, on the effect of pressure, temperature, moisture content, particle size and addition of adhesives, on tensile strength of briquettes and their cohesion during transport, storage and heating, and describes a number of European and American presses.

799. McKenzie, W. M. **Project U.16—Waste prevention. Sub-project U.16–1—Sawdust utilization. Progress report No. 2. An investigation of the suitability of sawdust for packing grapes.** Division of Forest Products, C.S.I.R.O., Melbourne. 1953. pp. 19 + 7 photos. 3 refs. P.R.

Shipments of grapes packed in sawdust fractions between 8- and 22-mesh, from Radiata Pine, Mountain Ash, Karri and Jarrah, and in granulated cork, when shipped within Australia, showed much degrade of the packing material. The addition of $\frac{3}{4}$-oz. metabisulphite [$Na_2S_2O_5$]/cu. ft. of packing material reduced the degrade considerably.

800. Ibbett, W. C. **The uses of sawdust in horticulture.** *Agriculture* 59 (12), 1953 (582–6). 9 refs. O.R.E.

Reviews the advantages and disadvantages of sawdust as a mulch and soil improver. It is best applied as composted sawdust or as well rotted material from old heaps. Fresh sawdust is best avoided with most crops, or, if used, needs at least $\frac{1}{2}$ cwt. $(NH_4)_2SO_4$/ton, and should not be dug into the soil before the end of the first season after application.

801. **Can sawdust provide needed organic matter?** *Bull. Wis. agric. Exp. Sta.* No. 500, 1953 (46–7). (Annual Report, Agricultural Experiment Station, University of Wisconsin, Madison, 1951/2, Part I).

Describes a composting method developed by C. B. Davey and S. A. Wilde. Maple sawdust is treated with anhydrous NH_3 (15 lb./cu. yd), H_3PO_4 ($2\frac{1}{2}$ lb./cu. yd.) and K_2SO_4 (5 lb./cu. yd.). Finally a wood-decaying fungus, *Coprinus ephemerus* is added and the material is allowed to ferment for several months. Greenhouse trials have shown that sawdust so treated has greatly increased the growth of tree seedlings and red clover.

84. PRESERVATION AND OTHER TREATMENTS TO IMPROVE THE PROPERTIES OF WOOD. DAMAGE BY BIOLOGICAL AGENCIES AND ITS CONTROL. SEASONING. TIMBERYARD PRACTICE

841. *Wood Preservation*

See also Nos. 870, 892.

802. **The preservation of wood: a selection of extracts from the papers presented at the annual convention of the British Wood Preserving Association [Cambridge, 1953].** *Wood* 18 (7), 1953 (265–9).

Covers papers on: The preparation of timber for preservative treatment (*N. A. Richardson*); Timber for marine work (*R. P. Woods*); Recent research and development in wood preservation in Germany (*G. Becker*); The value of surface treatments (*F. H. Hall*); Pressure creosoting—seeking better results with old plants (*J. T. Cosgrove*); Wood structure, extractives and permeability (*H. A. Cox* and *D. B. Irvin*); The main problems of wood preservation in France (*J. Benoit* and *C. Jacquiot*); and Codes of practice in relation to treated timber.

803. Martínez, J. B. **Preservation of timber: determination of the efficacy of a preservative, with an Appendix on the technique of culturing wood destroying fungi.** *Transl. Commonw. sci. industr. Res. Organ. Aust.* No. 1709, 1952. pp. 10 + 7 dgms. Transl. by H. E. Kijlstra from *Bol. Inst. for. Invest. Exp. Madrid* 10 (17), 1939 (13–21; 29–33). Limited distribution. [Cf. *For. Abstr.* 4 (p. 116).] P.R.

804. Duncan, C. G. **Evaluating wood preservatives by soil-block tests: 5. Lignite-tar and oil-tar creosotes.** *Proc. Amer. Wood Pres. Ass.* 48, 1952 (99–106). 4 refs. P.R.

The results obtained with the most tolerant fungus used (*Lentinus lepideus*) on conditioned and weathered blocks show that oil-tar creosotes (generator tar distillate, and hard-pitch distillate), when without any admixtures, have a low efficacy, while the hard-pitch distillate with pentachlorophenol is highly effective. Lignite-tar creosote is effective in inhibiting decay, provided not all of the

low-boiling (up to 270° C.) tar acids have been removed. *From author's summary.*

805. **Report of Committee P-6, Evaluation of wood preservatives.** *Proc. Amer. Wood Pres. Ass.* 48, 1952 (123–8). P.R.

Includes a proposed standard method for field tests with 2 × 4-in. stakes, and a method of recording test results based on an approximate logarithmic scale.

806. **Report of Committee P-4, New preservatives.** *Proc. Amer. Wood Pres. Ass.* 48, 1952 (115–20). P.R.

Contains a revised standard method for the determination of pentachlorophenol in oil or wood, and a method of determining the penetration of solvent used with oil-soluble preservatives. The following changes in the names of preservatives are recommended, the new names being given in brackets: Boliden salt (chromated zinc arsenate); Celcure (acid copper chromate); Chemonite (ammoniacal copper arsenate); Copperized CZC (copperized chromated zinc chloride), and Greensalt (chromated copper arsenate).

807. **Committee of Inquiry into timber preservation in New Zealand.** *Aust. Timb. J.* 19 (1; 3), 1953 (7 . . . 14, 51 . . . 58; 214 . . . 222). 29 refs.

Gives extracts from the report submitted by a committee set up by the government on the borax/boric-acid process, its efficiency in treating *Beilschmiedia tawa* against attack by fungi and wood-boring insects, the suitability of *B. tawa*, after treatment, for structural uses, and the value of the treatment for general purposes. The following conclusions are drawn: (1) Borax/boric-acid treatment is recognized as efficacious in preserving *B. tawa* from attack by insects and, in rather higher concentrations, from fungi; (2) *B. tawa* so treated can safely be used for flooring and interior finishing in light building construction, but is not suitable for weather-boarding and other exterior timbers; and (3) for the limited uses recommended under (2) above, boron compounds are effective as preservatives for timbers other than *B. tawa*.

808. McMullen, M. J. **Project No. P 14. The detection of preservatives in treated timber. Sub-project P 14–1. The detection of boron in treated timber by direct spot test. Progress report No. 1.** Division of Wood Technology, New South Wales Forestry Commission, Sydney. 1952. pp. 8. 16 refs. P.R.

Any previous treatment of timber with H_3BO_3 or $Na_2B_4O_7$ can be detected by applying to its surface a few drops of an alcoholic extract of turmeric powder followed by a few drops of an alcoholic solution of salicylic and HCl acids. A homogeneous bright stain produced indicates that the timber contains not less than ca. 0·2% H_3BO_3. *From author's summary.*

809. Schuch, K. Zur Methodik der Fluorbestimmung in der Holzschutzforschung. **[Method of determination of fluorine in wood preservation research.]** *Holzforschung, Berlin* 7 (1), 1953 (18–25). 15 refs. [G.g.e.] P.R.

Describes in detail a reliable method of determining F in wood, based on the fundamental research of Willard and Winter [*Industr. Engng. Chem.* (*Anal. Ed.*) 5, 1933 (7–10).]

810. **Laboratory tests on wood preservatives.** *Rep. For. Prod. Res. Bd., Lond. 1952*, 1953 (30).

Agar and wood-block tests on $NaF/CaCl_2$ mixtures indicate that when NaF is thoroughly mixed with soluble Ca salts it becomes inactivated as a wood preservative. It would seem better not to rely on pure NaF as a preservative for timber, e.g. laths, likely to come into direct contact with such materials as fresh lime plaster.

811. **Investigations into the effect of sodium fluoride on concrete, various metals and wood glues.** *Aust. Timb. J.* 19 (4), 1953 (286). 1 ref.

When concrete and metals were immersed in a 1% NaF solution and boiled daily for 3 hours over a period of 5 months, concrete showed no loss of weight or apparent deterioration, brass and copper were not unduly corroded (0·1–0·2% loss of weight) but galvanized iron and mild steel were corroded (1–3% and 4–7% loss respectively) and pitted. Urea formaldehyde, animal and casein glues behaved satisfactorily when used to bond solid timber containing 0·4% NaF. All tests of Tego bonded panels from fluoride-treated veneers were satisfactory except the weathering test.

812. Simon, A., and Tönjes, H. Beiträge über das Verhalten von Natriumpentachlorophenolat als Holzimprägnierungsmittel. **[Behaviour of Na pentachlorophenate as a wood preservative.]** *Holz Roh- u. Werkstoff* 11 (3), 1953 (104–11). 11 refs. [G.g.] P.R.

Describes a quantitative method of determining Na pentachlorophenate and a method for its detection. Its penetration in aqueous solution into wood has been evaluated by a number of known methods, and a method of estimating its penetration from pastes has been developed. It has been found that it diffuses in chromatographic paper just as readily as NaF. Its solubility in water is given for different temperatures. Evaluation of its leachability and leaching rate from impregnated wood blocks (conducted according to DIN 52176, sheet 2) shows that, in spite of its ready solubility in water, ca. $\frac{1}{3}$ is not leached out; the washings contain more of the Na^+ than of the pentachlorophenate ion. It is impossible to secure additional fixation by using CO_2, as the reaction involved is reversible.

813. Walters, C. S. **The effects of copper naphthenate and pentachlorophenol on livestock.** *Proc. Amer. Wood Pres. Ass.* 48, 1952 (302–13). 7 refs. P.R.

Results of tests on pigs, sheep and cattle show that, under the conditions of experiments, none of the livestock tested showed any visible effects from the use of treated housing or feeding equipment or fencing material. Experiments in which pigs and sheep were drenched with the chemical solutions point to the possibility of a noxious effect, and a set of precautions are given to preclude any harm being done to livestock by the use of Cu naphthenate or pentachlorophenol.

814. ENDRES, R., and DERESER, R. (to Farbwerke Hoechst). Verfahren zum Imprägnieren. [**Method of impregnation.**] *German Patent* No. 837,924, May 2, 1952. pp. 2. P.O.

The impregnation of wood with pentachlorophenol is effected by impregnating with an aqueous solution of NH_4 pentachlorophenate, removing the excess, and steaming, or drying, or treating with fumes of weak acids.

815. PROKOPP, S. Die Imprägnierung schwer tränkbarer Hölzer. [**Impregnation of woods that absorb the preservative sparingly.**] *Mitt. öst. Ges. Holzforsch.* 5 (2), 1953 (26–9). 12 refs. [G.] P.R.

A brief account of the history and present position of the problem.

816. MACLEAN, J. D. **Preservative treatment of wood by pressure methods**. *Agric. Handb. U.S. Dep. Agric.* No. 40, 1952. pp. 160. 65 refs.

Supersedes the 'Manual on preservative treatment of wood by pressure' (*Misc. Publ. U.S. Dep. Agric.* No. 224).

817. WAYMAN, P. **Reports of treatment methods committees**. *Proc. Amer. Wood Pres. Ass.* 48, 1952 (175–222). P.R.

Contains 7 committee reports, dealing with: Southern Pine, Jack Pine, Ponderosa Pine, Lodgepole Pine, Norway Pine, Douglas Fir, Larch, Western Red Cedar, Western Hemlock, Oak, Ash, Locust, Hickory, Black Walnut, Gum, and northern hardwoods. Includes results of a study on the treatment of Southern Pine poles with pentachlorophenol solution, and several new or supplementary standards.

818. KILROE-SMITH, T. A. **The chemical aspects of preservation of mine timbers. (With special refence to copper sulphate/sodium bichromate mixtures)**. *South African Mining and Engineering Journal, Johannesburg* 63, 1952 (791). P.R.

Stoichiometric calculations on Celcure show that (1) a weight ratio of 1% $Na_2Cr_2O_7$/0·61% $CuSO_4$ must be used if all the Cu is to be precipitated as basic Cu chromate or as hydroxide, and (2) for reduction by glucose, the maximum amount of $CuSO_4$ that can be fixed by $Na_2Cr_2O_7$ as basic Cu chromate plus insoluble Cu salts of organic acids, is given by the ratio 1·12% $CuSO_4$/1% $Na_2Cr_2O_7$, the cellulose oxidation products being shown to give the same ratio. If the ratio exceeds 1·37 $CuSO_4$/1·00 $Na_2Cr_2O_7$ (by weight) the excess cannot be fixed in the wood, the most probable optimum ratio being between 1·12 and 1·37, while the minimum ratio is 0·61/1·00. The final mixture recommended for the general treatment of mine timber is 1·3% $CuSO_4$ and 1·0% $Na_2Cr_2O_7$.

819. NUCKOLS, L. T. **Diversified use of treated wood on railroads**. *Proc. Amer. Wood Pres. Ass.* 48, 1952 (282–7). P.R.

Lists past and present practices for treating piles, bridge sleepers, decks, sign posts, truck parts, posts, poles etc., and the use of fire-retardant timbers in the structures of the Chesapeake District of the Chesapeake and Ohio Railway.

820. RICHARDS, A. P. **Co-operative creosote program. Preliminary progress report on marine exposure panels. Port Aransas, Texas, and Wrightsville Beach, N.C.** *Proc. Amer. Wood Pres. Ass.* 48, 1952 (15–26). P.R.

Preliminary results (3½ years after beginning of tests) appear to show that straight-run oils with higher residues give better results against *Limnoria* and Mollusca than the lower ones, a 70/30 creosote/coal-tar mixture being the best. *From author's summary.*

821. RABBAGE, L. H. **Use of pressure treated wood in New York City's waterfront structures**. *Proc. Amer. Wood Pres. Ass.* 48, 1952 (288–300). P.R.

An illustrated description.

822. GURD, J. M. **Some experiences with treated piling**. *J. For. Prod. Res. Soc.* 3 (2), 1953 (65, 90). I.F.B.

Discusses specifications for piling, seasoning and preservation, the effect of creosote on pile driving and service life, and the reduction of fire danger by the use of creosoted wood.

823. LUMSDEN, G. Q. **A quarter century of evaluation of wood preservatives in poles and posts at the Gulfport test plot**. *Proc. Amer. Wood Pres. Ass.* 48, 1952 (27–52). P.R.

Summarizes results of 25 years of outdoor exposure tests, covering over 100 specimens treated with standard and non-standard preservatives and exposed under typical tropical conditions. Best general results were obtained, among the oil-type preservatives, with low-residue creosote, and with pentachlorophenol solutions; among aqueous solutions, with Greensalt. A minimum average retention of 8 lb./cu. ft. of creosote, well distributed, seems to be necessary to assure long life in Southern Pine poles.

824. ASHBAUGH, F. A. **Relation between quality and pole service life**. *Proc. Amer. Wood Pres. Ass.* 48, 1952 (328–34). P.R.

The 'quality' of a pressure-treated Southern Pine pole is tentatively defined. It is claimed, on the basis of over 100,000 poles for which data are unusually complete, that a small increase in quality (and cost) produces a desirable increase in service life.

825. TACK, G. W., and BEESLEY, J. **Sub-project P.6–5: Tests of pole treatments in New South Wales using *E. grandis, E. maculata, E. pilularis,* and *E. saligna* pole stubs. Progress report No. 7. Sixth inspection and third retreatments 1951**. Division of Forest Products, C.S.I.R.O., Melbourne. 1952. pp. 16 + 7 + 30 photos + 5 tbls. P.R.

Results after 15–16 years of test show that very satisfactory protection has been afforded by the following treatments: (1) creosote oil (open-tank butt treatment; open-tank full-length treatment, and butt-brush and soil-puddle method; (2) oxyacetylene charring and creosote-oil spray process; and (3) 'Cuprinol' butt-dip and top-brush treatment.

826. SHIBAMOTO, T., and SHOJI, R. [**Studies on the so-called Boucherie process for preserving wood poles with pentachlorophenates.**] *Bull. Tokyo Univ. For.* No. 44, 1953 (187–99 + 6 photos). 7 refs. [Jap.jap.e.]

Na- and NH_4-pentachlorophenate penetrated satisfactorily into sapwood of *Cryptomeria japonica*

and *Chamaecyparis obtusa* by the Boucherie process. Adequate protection was obtained with a retention of 1·3 kg. but not with 0·4 kg./cu.m. Retention amounts were nowhere uniform. The rate of penetration was always greater at high than at low concentrations but always below that of $CuSO_4$. Leaching of Na pentachlorophenate was much below that of $CuSO_4$, and retreatment with $Al_2(SO_4)_3$ proved very suitable. *From authors' summary.*

827. BRYANT, B. S. **The effect of incising on the bending strength of crossarms.** *J. For. Prod. Res. Soc.* 3 (2), 1953 (47–8, 88). I.F.B.

Statistical analyses on the results of strength tests on 16 carefully matched pairs of incised and unincised crossarms showed a slight but significant loss in static bending strength, but this loss is not significant in comparison with the natural variations in strength in unmatched material. Because of the increase in sideways penetration of preservative as a result of incising, matched pairs after a period of service should show equal strength.

828. BLEW, J. O., JR., and CHAMPION, F. J. **Preservative treatment of fence posts and farm timbers.** *Fmrs'. Bull. U.S. Dep. Agric.* No. 2049, 1952. pp. 33.

A revision of *Fmrs' Bull.* No. 744 (1923).

842. *Treatments to Improve the Resistance of Wood to Physical and Chemical Agencies other than Fire*

829. POWERS, G. E. **Dense wood opens new markets.** *Wood, Chicago* 57 (10), 1952 (30–1, 52). 2 refs. P.R.

Describes different uses of 'Strata-wood' and 'Gaugewood', varieties of impregnated compressed woods.

830. MOSKALEVA, V. E. Issledovanie stroenija pressovannoĭ drevesiny pri mehaničeskom razrušenii. **[Investigation of the structure of compressed wood [Lignostone] during mechanical failure.]** *Trud. Inst. Les.* 4, 1949 (237–46). 11 refs. [Russ.russ.]

The results of an investigation on Lignostone show that, after radial pressure (I) both vessels and fibres are compressed in the radial direction, while the rays are corrugated to a varying extent; after pressure in 2 directions (tangential followed by radial) (II), both vessels and fibres are flattened tangentially and stretched radially, while the corrugation of rays is less pronounced; thus pressing in 2 directions yields an anatomical structure similar to that ensuing from tangential pressure only. The radial compression strength is greater for I whereas the tangential compression strength is greater for II. The limit of plastic flow is the same for both in compression ||; it is higher by 19% for II in compression ⊥. Mechanically damaged fibres of (Birch) Lignostone react to $ZnCl_2$-iodine just as natural wood does. The first signs of failure in Lignostone (grouping of slip lines in places of highest stress) appear at loads exceeding the limit of plastic flow and approaching the maximum load. *From author's summary.*

831. TARKOW, H., and STAMM, A. J. **Effect of formaldehyde treatments upon the dimensional stabilization of wood.** *J. For. Prod. Res. Soc.* 3 (2), 1953 (33–7). 14 refs. [U.S. Forest Products Laboratory, Madison.] I.F.B.

Experimental treatments of wood with formalin did not increase stabilization; treatment with solutions of formalin in morpholine (optimum morpholine content about 25%) gave good results but alternate water-soaking and oven-drying caused leaching and volatilization of the morpholine-formaldehyde complex, so that the treatment would be of no practical value in reducing shrinkage and swelling. When wood was treated in the presence of formaldehyde vapour and small amounts of mineral-acid vapour [cf. *For. Abstr.* 14 (No. 2790)], a high degree of stability was reached without the marked increase in tangential dimensions that would take place if the stabilizations were due to bulking rather than to cross-linkage. An excess of moisture content in the wood hindered the reaction, and the optimum m.c. decreased with decreasing temperature of treatment. Maximum stabilization was obtained when concentrated HCl or HNO_3 was sprayed into the reaction chamber; H_2SO_3 and HCOOH were ineffective as catalysts. The amount of HCl or HNO_3 needed was difficult to determine, varying with a number of variables. Buffering experiments indicated that very acid conditions, pH 1·2, were needed to produce measurable stabilization and that to effect worthwhile stabilization the pH of the adsorbed water must be below 1·0. The evidence that acetal cross-links are formed when wood is exposed to acidified formaldehyde vapour is discussed. Increased dimensional stabilization was accompanied by increased brittleness and very low resistance to abrasion; these make the treatment quite unpractical.

832. HERZNER, R. A. Vergütung des Holzes durch elektrische Auslaugung. **[Improving wood by electric leaching.]** *Zbl. ges. Forst- u. Holzw.* 71 (4), 1952 (355–78). 23 refs. [G.g.e.]

Tabulates and discusses the results of laboratory and semi-industrial experiments on the application of D.C. to remove (by electro-dialysis, electro-osmosis, and electro-phoresis) electrolytes and charged colloids from wood. Small (ca. 10 × 2·5 × 2 cm.) and large (ca. 22 × 6 × 2·5 cm.) specimens of different conifers and broadleaved species were used, the applied voltage being either 220 or 440 volts; the specimens, both treated and controls, were first dried to m.c. 0% (at temperatures up to 105° C.), and then subjected to the action of humid air or water to determine the m.c. regain and the degree of swelling. It was found that, after 16 days of contact with air of 92% relative humidity, untreated Beechwood had a m.c. of 12·2% whereas that of treated Beechwood was only 10·0%. The amount of swelling (radial, tangential, volume) for the treated wood was ca. 40% (14-day treatment) or ca. 60% (7-day treatment) of that for untreated Beechwood, tangential swelling being affected in a greater degree than radial swelling. The treatment reduced the fibre-saturation point of wood. The absorption of liquid water was greater for the treated than for the untreated wood. Treated woods were less sensitive to fungal attack than untreated. The process removes electrolytes (mineral constituents) from wood

at an incomparably greater rate than simple leaching with e.g. tap-water. Best results were obtained with distilled water, then with rainwater and water of condensation, followed by tap-water of different hardnesses. After 4 days of treatment (using tap-water of medium hardness), wood specimens had nearly the same density and resistance to abrasion as before; the compression strength parallel to the grain decreased by 6–8%. Treated round Beech-wood rods 1–1·65 cm. diam. and 1–2 m. long showed a higher absorption of preservatives (Wolman salts, Carbolineum) than untreated. An electro-dialyser of simple contruction is described and illustrated; it has a capacity of ca. 1·5 cu.m., and contains a set of magnetite anodes and an Fe or brass gauze cathode, each electrode being placed in a canvas bag impregnated with polyvinyl acetate; the rinsing water circulates in these bags.

843. *Fireproofing and Fire Resistance*

See also No. 980.

833. VOLKMANN, K., and ZIEKE, K. (to Bayerische Stickstoff-Werke A. G.). Verfahren zum Feuerfestmachen von Holz und Geweben. [**Method of fireproofing wood and textile materials.**] *German Patent* No. 764,250, March 31, 1952. pp. 2. [G.] P.O.

The surface of the materials is treated with aqueous solutions of the condensation products of dicyandiamide, dicyandiamidine, guanidine or melamine, and their salts, with aldehydes, in particular formaldehyde.

844. *Attack by Plant Organisms*

See also No. 614.

834. LINDGREN, R. M. **Deterioration losses in stored Southern Pine pulpwood.** *Tappi* 36 (6), 1953 (260–4). 7 refs. P.R.

[Cf. *For. Abstr.* 14 (No. 782).] Rough Southern Pine pulpwood, when stored during 2, 4, and 6 months in the southern part of the U.S.A., lost 2–4, 6–8, and 8–10% (summer storage), and 0–1·5, 1·5–3, and 3–5% (winter storage) in weight. Barked wood deteriorated at first more, but later less, rapidly than unbarked wood. The chemical composition of the woods did not change appreciably. The main effect on groundwood pulp was a decrease in brightness. Factors contributing to low storage losses are discussed for both unbarked and barked wood. *From author's summary.*

844.1. Sap-staining and Mould Fungi

See also No. 836.

835. LINDGREN, R. M. **Permeability of Southern Pine as affected by mold and other fungus infection.** *Proc. Amer. Wood Pres. Ass.* 48, 1952 (158–74). 6 refs. P.R.

Presents results of tests in 1949–51 at the Harrison Experimental Forest, Saucier, Miss., on the permeability of wood (Longleaf Pine being the main species) having: (1) heavy *Trichoderma* mould, (2) mixed mould (including *Trichoderma*), and (3) little or no infection. It has been found that *Trichoderma* greatly increases the permeability of posts to oil- and water-soluble preservatives and to rainwater, the absorption in woods with heavy mould being up to 5 times that of uninfected wood. [Cf. *For. Abstr.* 14 (No. 2806).]

844.2. Wood-destroying Fungi

See also Nos. 352, 406–11, 472, 678, 803, 853–4, 942.

836. TSUKIJI, R. **Decay durability of blue-stained timber.** *Wood Industry* [, *Japan*] 7 (3), 1952 (16–8). From *abstr.* in *Rec. Res. Fac. Agric. Univ. Tokyo* No. 2, 1951/52 (1953), (56–7). [E.]

Test pieces of *Pinus densiflora* were stained blue during 50 days' exposure to cultures of *Ceratostomella ips.* Their weights were unchanged as a results of the staining. They were then tested for their resistance to decay by *Lenzites albida*, *Fomes pinicola*, *Polyporus volvatus*, and *Schizophyllum commune* and were found to be as resistant as sound timber. The filtrate of the culture solution of *C. ips* contains substances that control the growth of mycelium of wood-rotting fungi. These substances are decomposed by heat. Their growth-inhibiting ability is weak. [Cf. *For. Abstr.* 14 (No. 2805).]

837. JØRGENSEN, E., and VEJLBY, K. **A new polyphenol oxidase test.** *Physiol. Plant., Copenhagen* 6 (3), 1953 (533–7). 9 refs.

By cultivation on a red-cabbage medium, wood-rotting fungi are easily classified into those that produce polyphenol oxidase and those that do not. The former change the original purple colour of the medium to yellow and the latter to red. This method is quick and more suitable than Bavendamm's test.

838. GOTTLIEB, S., and PELCZAR, M. J., JR. **Microbiological aspects of lignin degradation.** *Repr.* from *Bacteriological Reviews, Baltimore* 15 (2), 1951 (55–76). 97 refs. X.

A review of literature.

839. KONETZKA, W. A., PELCZAR, M. J., JR., and GOTTLIEB, S. **The biological degradation of lignin. III. Bacterial degradation of *alpha*-conidendrin,** *Repr.* from *Journal of Bacteriology, Baltimore* 63 (6). 1952 (771–8). 9 refs. X.

Cf. *For. Abstr.* 12 (No. 2051).

840. DAY, W. C., GOTTLIEB, S., and PELCZAR, M. J., JR. **The biological degradation of lignin. IV. The inability of *Polyporus versicolor* to metabolize sodium lignosulfonate.** *Repr.* from *Applied Microbiology, Baltimore* 1 (2), 1953 (78–81). 11 refs. X.

841. NARAYANAMURTI, D., and VERMA, G. M. Zersetzung von Holz und anderen Stoffen. [**Decomposition of wood and other substances.**] *Holz Roh- u. Werkstoff* 11 (6), 1953 (226–7). [G.g.] P.R.

[Cf. *For. Abstr.* 14 (No. 777).] Experiments with *Polystictus sanguineus* grown on liquid peptone and on *Dalbergia sissoo* (sawdust, planing chips, sticks) have shown that: (1) more glucose was consumed than peptone, and (2) pure cellulose was not attacked in the peptone culture. The fungus belongs to the 'white rot' category only in so far as it attacks lignin more readily than cellulose, but the cellulose/lignin ratio increases as the decay progresses. *From author's summary.*

842. **Physiology of wood-rotting fungi.** *Rep. For. Prod. Res. Bd., Lond. 1952*, 1953 (29–30 + 1 photo).

Laboratory experiments showed that wood-rotting fungi vary considerably in their ability to survive in air-dry wood; active cultures can still be obtained after 8 years from samples of wood infected with *Lenzites sepiaria* and *L. trabea* and kept in a dry atmosphere, but *Merulius lacrymans* failed to survive 7 months' storage in atmospheres of 90, 76, 58 and 44% relative humidity.

Preliminary experiments have shown that stimulation in the growth of wood-rotting fungi, occurring when samples of wood are introduced into the culture vessel, is exerted even if the wood is not in actual contact with the fungus mycelium, indicating that it is due to some volatile substance given off by the wood. It remains to be proved whether the fungus is stimulated in such a way that its growth is directed towards the source of the volatile compounds, i.e. whether a chemotactic effect can direct growing mycelium definitely towards the wood.

The first results of tests to determine the relationship between loss in strength and % weight loss of Beech attacked by *Chaetomium globosum* in comparison with that attacked by white-rot and brown-rot fungi show that, at least in the early stages in the laboratory, Beech attacked by *C. globosum* loses weight as quickly as when attacked by *Coniophora cerebella* or *Polystictus versicolor*. Some indication was also obtained that the rate of attack of Beech by *C. globosum* is proportional to the amount of mineral nutrients available to the fungus. [Cf. *For. Abstr.* 14 (No. 1599).]

843. **Breakdown of timber in water-cooling towers.** *Rep. For. Prod. Res. Bd., Lond. 1952*, 1953 (32).

[Cf. *For. Abstr.* 14 (No. 1599).] Laboratory tests have been made to ascertain the possibility of selecting hardwoods for filling-timbers in water-cooling towers by exposing them to attack by *Chaetomium globosum*, both untreated and after leaching with warm water for periods up to 8 weeks. Opepe [*Sarcocephalus diderrichii*], Greenheart [*Ocotea rodiaei*] and Wallaba [*Eperua* sp.] were not attacked, but Wallaba exuded a very sticky gum on being leached and is therefore considered unsuitable. Tallowwood [*Eucalyptus microcorys*], both leached and unleached, suffered only slight losses in weight, confirmed by microscopic examination as being due to fungal attack. Nyankom [*Tarrietia utilis*] and Beech showed marked decay, with losses greater in leached than in unleached Beech. Samples of resin-bonded Gaboon [*Aucoumea klaineana*] plywood in which the veneers had been impregnated with a synthetic resin exposed to similar treatments showed only slight weight losses and evidence of attack by *C. globosum*, in marked contrast to severe attack in ordinary Gaboon plywood controls bonded with the same adhesive.

844. **['Soft rot' in timber exposed to sea water.]** *Rep. For. Prod. Res. Bd., Lond. 1952*, 1953 (33).

Samples of Gaboon plywood and solid Makoré [*Mimusops heckelii*] exposed to the sea for one year showed soft rot, i.e. attack similar to that found in water-cooling towers [cf. *For. Abstr.* 14 (No. 1599)]. The marine fungus, *Helicoma maritimum*, previously recorded as causing decay of wood blocks immersed in the sea, was isolated from these timbers.

845. Browning, B. L., and Bublitz, L. O. **Wood deterioration in cooling towers. Changes in chemical composition during deterioration.** *Industr. Engng. Chem.* 45 (7), 1953 (1516–20). 12 refs. P.R.

Describes and tabulates results of chemical tests on 8 Redwood samples taken from cooling towers in the Texas-Louisiana area. Most of the samples had picked up considerable quantities of inorganic material. All those exposed to water had lost a large part of the alcohol-soluble extractives. Only one sample showed marked delignification and a decrease in methoxyl content. The α-cellulose content of the wood was drastically reduced where lignin enrichment occurred. The pentosans have proved to be markedly resistant. The lignin enrichment rather than delignification, observed in the tests, suggests the prevalence of biological attack [Cf. *For. Abstr.* 14 (No. 1598).]

846. Kamei, S., and Amikura, T. **[A brown pocket heart rot of Jezo Spruce (*Picea jezoensis*).]** *Res. Bull. exp. For. Hokkaido Univ.* 16 (2), 1953 (175–95 + 2 plates). 11 refs. [Jap.e.]

The causal fungus of a characteristic brown pocket rot of logs was isolated and identified as *Lentinus kaufmannii*. The rot and the growth of the fungus in culture are described. No accurate figures as to the frequency of attack are available but it is considered to be of importance in Hokkaido. [Tables and photographs have English legends.] *From authors' summary.*

847. Aoshima, K. **[Wood-rotting *Poria* from Japan (II).]** *Bull. For. Exp. Sta., Meguro, Tokyo* No. 59, 1953 (57–66). 7 refs. [Jap.e.]

Describes with illustrations [legends in English] *Poria lenis*, *P. radula*, *P. rixosa*, *P. versipora* and *Fuscoporia weirii*. [Cf. *For. Abstr.* 13 (No. 972).] *From author's summary.*

848. Mayer-Wegelin, H. Die Festigkeit verstockten Rotbuchenholzes. **[Strength of decayed Beech wood.]** *Holz Roh- u. Werkstoff* 11 (5), 1953 (175–9). 16 refs. [G.g.] P.R.

Density, compression strength, and work to maximum load were determined for specimens showing different degrees of discoloration and decay, from absolutely sound and not discoloured to totally attacked with white rot on 100% of the cross-section area. The density remained almost unaltered during the initial brown discoloration, as well as when 10% of the cross-section area was covered with white rot; as the white rot progressed, the density decreased, to reach the value of 0·594 for completely white-rot-covered wood, compared with 0·690 for sound wood (nominal density at 12% m.c.). The compression strength decreases steadily but not considerably as the white rot progresses, whereas the work to maximum load begins to decrease rapidly as soon as the first small spots of white rot appear. The white rot loosens in the first place the secondary walls of hard fibres, then the entire cell structure of the supporting tissue and, finally, the middle lamellae,

leaving the rays and vessel walls unattacked. [Cf. *For. Abstr.* 13 (No. 1649).]

844.4. Control and Prevention

849. CARTWRIGHT, J. B., EDWARDS, D. W., and MCMULLEN, M. J. **Sterilization of timber with methyl bromide.** *Nature, Lond.* 172 (4377), 1953 (552–3). 2 refs. [Division of Wood Technology, N.S.W. Forestry Commission, Sydney.]

The effectiveness of MeBr as a fumigant for insect-infested timber has been reported already [cf. *For. Abstr.* 13 (No. 4347)]; its value as a sterilizing agent for timber infected by stain and rot fungi has now been investigated and the results are tabulated. Various combinations of gas concentration and fumigation time were used; the most effective treatment tested was 12 lb./1000 cu. ft./96 hr., but 20 lb./1000 cu. ft./24 hr. was moderately successful. The results suggest the possible use of MeBr as a fumigant for the sterilization of fungus-infected timber, especially in large stocks or where heat treatment may be undesirable or impracticable.

850. VERNEAU, R. Sterilizzazione parziale delle doghe di castagno da esportazione. [**Partial sterilization of Chestnut staves for export.**] *Ann. Sper. agr.* (*n.s.*) 7 (2), 1953 (539–45). [It.it.e.] C.G.B.

Experiments made at the Osservatorio di Fitopatologia per la Campania at Portici showed that *Endothia parasitica* present in Chestnut staves can be killed by subjecting the wood to a temperature of 75° C. for 30 min. in a very moist, or a temperature of 85° for an hour in a very dry atmosphere.

845. *Attack by Animals*

See also No. 44.

845.1. Marine Borers

See Nos. 820–2.

845.2. Terrestrial Borers

See also Nos. 489 *et seq.*, 755, 950.

851. FREEMAN, J. A. **The inter-relation of insect attack on stored food and on wood.** *Trans. 9th int. Congr. Ent., Amsterdam 1951* 1, 1952 (719–22). 4 refs. [E.] I.I.E.

Gives examples from the experience of the Infestation Control Division of the Ministry of Agriculture in England and Wales of serious damage to wooden boxes used for packing food, and to structural timbers of food factories and warehouses, by food pests (especially *Dermestes* spp.) and ordinary wood-destroying insects. [Cf. *For. Abstr.* 12 (No. 1203).]

852. FISHER, R. C. **New problems in the control of timber insects.** *Ann. appl. Biol.* 40 (1), 1953 (215–8). [Forest Products Research Laboratory, Princes Risborough.] O.R.E.

Reviews problems of the reduction of damage to imported tropical hardwoods by ambrosia beetles, and the control of *Hylotrupes bajulus* and *Anobium punctatum.*

853. BLETCHLY, J. D. **A summary of some recent work on the factors affecting egg-laying and hatching in *Anobium punctatum* De. G. (Coleoptera-Anobiidae).** *Trans. 9th int. Congr. Ent., Amsterdam 1951* 1, 1952 (728–34). 6 refs. [E.] I.I.E.

[Cf. *For. Abstr.* 13 (No. 4343).] Research at Princes Risborough has given the following results: (1) The % of eggs laid on equal surfaces of blocks glued with blood, hide and urea-formaldehyde glues was 41·9, 36·9 and 21·2% respectively on Scots Pine and 42·5, 37·4 and 20·1% on Beech. (2) At 20° C., relative humidities of about 56% are critical for viability and incubation period of eggs. Above that figure conditions are suitable for hatching and higher humidities have little effect in shortening incubation period, and below it the incubation period becomes rather longer and viability decreases. Temperature appears to have more effect on length of incubation, higher average temperatures shortening it. The limits of variation in the length of the period are considerable, whether in the incubator, in the laboratory, or out of doors. (3) At 22° C. and 76% r.h. only about half the larvae that hatched established themselves in sound wood but where slight decay was present a higher proportion was successful. This was more noticeable on Beech than on Turkey Oak and Scots Pine. The data obtained from Beech suggests that more extensive decay may not have any increased effect on larval establishment.

854. BLETCHLY, J. D. **The influence of decay in timber on susceptibility to attack by the common furniture beetle, *Anobium punctatum* de G.** *Ann. appl. Biol.* 40 (1), 1953 (218–21). O.R.E.

Preliminary results of research in progress at Princes Risborough. The development of *A. punctatum* in decayed as compared with sound sapwood was studied in freshly converted wood decayed and stored for 7 years, wood decayed after being in store from 14 to 20 years, and wood decayed immediately after winter felling. The decayed wood proved more suitable for egg-laying and initial larval penetration, and in woods attacked by white rot the larvae grow more quickly, though fewer may survive. There is, however, no indication that the life cycle is shortened as with the death-watch beetle [cf. *For. Abstr.* 3 (223)]. Survival of larvae in wood decayed by brown rot seems to be even lower than in wood decayed by white rot.

855. MASON, C. G. W. **Some notes on the incidence and control of wood-boring insects in New Zealand.** *New Zealand Science Review, Wellington* 10 (7), 1952 (103–6). 6 refs. N.C.L.

Notes are given on the more important species (*Anobium punctatum, Ambeodontus tristis, Lyctus* spp., *Calotermes brouni*, and *Prionoplus reticularis*) and their control.

The increasing use of *Pinus radiata* in buildings makes its susceptibility to borer attack a matter of importance. Trees grown in shelterbelts, which reach maturity before being converted, usually develop considerable heart timber and this is relatively immune to attack. Plantation-grown Pine, however, has a large proportion of sapwood, and egg-deposition preference tests showed that it ranks with sapwood of Rimu in attractiveness to *Anobium.* A further finding is that sapstain on *P. radiata*

encourages egg deposition by *Anobium*; in tests on blocks of *P. radiata* with about half the surface stained with characteristic streaks of sapstain, 90% of the eggs deposited were on the sapstained portions. Another test was designed to show the difference in attractiveness of various colours to *Anobium* beetles. Preliminary results indicate that beetles were found on different colours in the following proportions: red 41%, pink 23, yellow 12, green 9, blue 6, lavender 5, orange 4. Further tests are to be made under more strictly controlled conditions, and the possibility of preventing egg deposition by painting wood the appropriate colour is envisaged. The partiality to sap-stained timber, mentioned above, may be connected with this colour preference.

856. GAY, F. J. **Observations on the biology of *Lyctus brunneus* (Steph.).** *Aust. J. Zool.* 1 (1), 1953 (102–10). 3 refs. O.R.S.

A laboratory investigation was made on *L. brunneus*. Beetles were able to oviposit within 24 hr. of emergence from timber and deposited an average of 70 eggs per ♀ over 1–2 weeks, at depths of 1·0–6·5 mm. (the ranges varying for different timbers), preferentially on transverse surfaces. Egg incubation ranged from 6–7 days at 26° C. to 19–20 at 15°. Development to the adult stage took about 16 months at 15°, decreasing with increasing temperature to 4 months at 26°, apparently the optimum temperature; at 30°, fewer beetles emerged and took about 6 months to do so. With optimum conditions of temperature (26°), relative humidity (75%) and nutrition, the time could be reduced still further; on 127 blocks of *Sterculia acerifolia* emergence took 63–114 days, with an average of 75·5 days; the sex ratio was found to be 1 : 1. Adults lived 2½–7 weeks, ♀s being rather longer lived. The larvae were rather more resistant to heat than the eggs but exposure for ½ hr. to 50° killed both.

857. JACQUIOT, C. Les *Lyctus*. **[*Lyctus* spp.]** *Étude tech. Inst. nat. Bois* No. 13, 1950. pp. 8. [F.] P.R.

Describes the biology of and control measures against *L. linearis* and *L. brunneus*.

858. **Lyctus powder post beetles: investigation of treatment in stack.** *Rep. For. Prod. Res. Bd., Lond. 1952*, 1953 (34).

Examination was completed on experimental stacks of flat-sawn Oak, treated in May 1951 and exposed to attack by *L. brunneus*. The treatment consisted of a 5% DDT emulsion in water or 1% γ BHC made up from a water-dispersible powder, applied by a commercial type of insecticidal fog sprayer. Results confirm that this treatment fails to prevent attack in parts of the stack furthest from the point of application. Similar results were obtained with DDT applied as a spray to a stack of square-edged timber, the treatment being insufficient to protect the inner boards. [Cf. *For. Abstr.* 13 (No. 4345).]

859. **[The use of insecticidal smokes against *Lyctus*.]** *Rep. For. Prod. Res. Bd., Lond. 1952*, 1953 (36).

Experiments with DDT/lindane (γ BHC) smoke generators have been carried out in a room of 650 cu. ft. capacity. Chemical estimation of the insecticidal deposits obtained on filter papers placed in different positions throughout the room showed variations, according to dosage, from 8·5–70 mg./sq. ft. on upper horizontal surfaces to 2·73 mg. on under-surfaces. *Lyctus* beetles confined for 24 hr. on upper horizontal surfaces with the above deposits were rapidly affected and egg-laying was prevented. The smaller deposits on under-surfaces failed to affect the beetles or to prevent egg-laying. Results with this proprietary mixture of DDT and BHC are similar to those obtained in earlier experiments [see *For. Abstr.* 13 (No. 4346); 14 (No. 1671)] in which each type of insecticidal smoke was tested separately.

860. **Heat sterilization treatments.** *Rep. For. Prod. Res. Bd., Lond. 1952*, 1953 (34–5).

Shortage of material restricted tests on Ramin [*Gonystylus* sp.] containing living larvae and beetles of *Heterobostrychus aequalis* but results show that while the 130° F. schedule gives 100% kill, treatment at 125° is not completely effective.

861. PEAKE, F. G. G. **On a Bostrychid wood-borer in the Sudan.** *Bull. ent. Res.* 44 (2), 1953 (317–25). 6 refs.

Studies were made of *Sinoxylon senegalense* in the laboratory, and data are presented on the life history of this important pest of *Acacia seyal* and the nature of its attack. Several types of preventive treatments of logs were tested. Pentachlorophenol sprayed on barked logs proved the most effective.

862. DUFFY, E. A. J. **A monograph of the immature stages of British and imported timber beetles (Cerambycidae).** British Museum (Natural History), London. 1953. pp. viii + 350 + 8 plates. 25 pp. of refs. Price £4.4*s*.

Contains the following sections: introduction (economic importance); general account of the biology of Cerambycidae; general morphology of cerambycid larvae; characters of cerambycid pupae; descriptions and bionomics of the immature stages; and collection and preservation. There are many illustrations, an extensive bibliography and an index.

863. HESPELER, O. Auftreten und Bekämpfung des Hausbocks. **[Occurrence and control of *Hylotrupes bajulus* [in Germany].]** *Trans. 9th int. Congr. Ent., Amsterdam 1951* 1, 1952 (715–8). [G.] I.I.E.

864. MATEUS, T. J. E. Principais aspectos do problema da protecção das madeiras, em especial contra o *Hylotrupes bajulus*. **[The protection of timber, with special reference to *H. bajulus*.]** *Publicação, Laboratório de Engenharia Civil, Lisboa* No. 20, 1952. pp. 71. 20 refs. [Port.port.f.e.] P.R.

Deals with: (1) damage caused by *H. bajulus* in Portugal, in particular to structural timber of *Pinus pinaster*; (2) factors influencing the spread of the pest, such as time of felling, age of the tree, non-removal of bark from logs, resin-tapping, seasoning, storage conditions, and preservative treatment of timber; (3) preventive measures; and (4) treatment of timber already infested.

865. SCHMIDT, H. Scheibenbockmassenbefall auf Holzplätzen. **[Mass attack by *Phymatodes***

***testaceus* in timber dumps.**] *Holz-Zbl.* 79 (72), 1953 (807). [G.]

866. JOVER, H. Note préliminaire sur la biologie des Platypodidae de Basse-côte d'Ivoire. **[Preliminary note on the biology of Platypodidae of the Lower Ivory Coast.]** *Rev. Path. vég.* 31 (2), 1952 (73–81). 7 refs. [F.f.] I.M.I.

Discusses the time of day and climatic conditions for the arrival of insects on the log, the time elapsing between felling and arrival varying with species of tree and insect; mating; specialization by ♂s, ♀s and larvae in constructing the tunnels, and reduction of the attack as a result of resin secretion by the tree and predator attack.

867. **Report of special Sirex wood wasp committee of inquiry: conclusions and recommendations.** *Aust. Timb. J.* 19 (3), 1953 (189 . . . 208). [Cf. *For. Abstr.* 13 (Nos. 4348–9); 15 (Nos. 504–5).]

Recommendations include: provision of equipment and materials for fumigating at each major port; no further import of prefabricated houses unless suitably treated in the country of origin until ports are so equipped; government certificates specifying that heat treatment has been given or that timber is from living healthy trees from the exporting country; and restriction of movement of timber from any areas of establishment of *Sirex* in Australia.

868. **Replies by European authorities to a questionnaire on the Sirex wood wasp.** *Aust. Timb. J.* 19 (4), 1953 (270 . . . 285).

Records replies from Great Britain, France, Germany and Rumania to questions on the effect of ecological conditions on *Sirex* infestation; the effect of age and health of trees on their susceptibility to attack; the main species of *Sirex* and *Urocerus* in Europe and their distribution, and species attacked; the present state of infestation in Europe and reasons for the unusually heavy infestation in European softwood timbers now being imported into Australia; the probable reasons for the establishment only of *S. noctilio* in *Pinus radiata* plantations in New Zealand; the completion of the life cycle in fallen logs and sawn timber; parthenogenetic reproduction; associated fungus attack; and methods of treating large shipments of infested timber. [Cf. *For. Abstr.* 14 (Nos. 791–2).]

845.3. Termites

See also Nos. 47–8, 451–2.

869. WEIDNER, H. Die Ausbreitung der Termite *Reticulitermes flavipes* (Kollar) in Hamburg. **[The spread of *R. flavipes* in Hamburg.]** *Trans. 9th int. Congr. Ent., Amsterdam 1951* 1, 1952 (829–32). [G.] I.I.E.

Since its first appearance in Hamburg in 1937, *R. flavipes* has passed from a curiosity to a dangerous pest. [Cf. *For. Abstr.* 14 (No. 3904).]

870. HUNT, G. M., and SNYDER, T. E. **An international termite exposure test—twenty-first progress report.** *Proc. Amer. Wood Pres. Ass.* 48, 1952 (314–27). P.R.

Tabulates and discusses the results to date of exposure tests on Pine sapwood stakes impregnated with numerous preservatives and exposed to fungi and termites in various parts of the world during the last 23 years.

871. SHELFORD, V. E. **Termite treatment with one per cent solution of chlordane.** *J. econ. Ent.* 46 (3), 1953 (527–8). 4 refs.

[Cf. *For. Abstr.* 14 (No. 794).] The fifth annual report. There was no evidence of reduced toxicity in the soil.

847. *Drying* (*Seasoning*)

See also Nos. 650, 656, 666–7, 729, 777, 928.

872. VILLIÈRE, A. Sur le séchage du bois. Idées simples et orientations. **[Seasoning of wood. Simple ideas.]** *Rev. Bois Appl.* 8 (6), 1953 (14–8). [F.]

The duration of air seasoning adopted in France (1 year for each cm. of thickness for hardwoods, and half that time for softwoods) can be reduced to 2–3 months for softwoods of 2·5–3 cm., and double that figure for hardwoods, if the wood is properly stacked. The main condition is to raise the stack so as to leave a space of at least 4–5 cm. between the ground and the lowest wood layer. It is also advisable to stand the boards vertically for a few days before stacking. The technique of stacking is described in detail. Most French sawmills could obtain shipping-dry timber within less than 6 months by air seasoning.

873. PARRA, A., BORGO, G., and VALDÉS, F. El secado de maderas en estufa. **[The kiln-drying of timber.]** Asociación Mexicana de Profesionistas Forestales, Mexico. 1953. pp. 119. Numerous refs. [Span.] I.F.B.

A practical handbook, which includes a brief glossary.

874. REHMAN, M. A. **The seasoning behaviour of Indian timbers. Part II. (Kiln drying schedules).** *Indian For.* 79 (7), 1953 (369–75).

Gives 7 schedules with lists of over 60 species to which they are applicable. [Cf. *For. Abstr.* 13 (No. 3444).]

875. **Kiln seasoning [of imported hardwoods].** *Rep. For. Prod. Res. Bd., Lond. 1952*, 1953 (11).

The presence of tension wood had caused partly-dried Andiroba [*Carapa guianensis*] to become badly distorted, but by careful stacking, weighting and steaming the load at high temperatures initially and finally, the kiln-dried material was in much better shape than before seasoning. Bisselon [*Khaya senegalensis*] dried as well as the less dense African Mahogany [*K. ivorensis*?]. One-inch Obeche [*Triplochiton scleroxylon*] dried very satisfactorily under a much more severe schedule than had been recommended, in just under 4 days. Experimental loads of Kurokai [*Protium decandrum*], Wamara [*Swartzia calycina*] and Alstonia [*A. congensis*] proved refractory, except Alstonia.

876. EGNER, K. Zur Steuerung der künstlichen Holztrocknung. **[Control of artificial seasoning.]** *Holz-Zbl.* 79 (83), 1953 (911–3). 5 refs. [G.]

An illustrated description of different instruments used for the measurement of air temperature and humidity in kilns, and moisture content of wood (both inside and outside the kiln) with special

reference to resistance-type electrical moisture meters.

877. Ćurčić, S. Izračunavanje potrebne količine pare za rad sušare komornog tipa. **[Evaluation of steam consumption in compartment-type seasoning kilns.]** *Šumarstvo* 6 (1), 1953 (21–8). 8 refs. [Serb.f.]

Fundamental equations and formulae are derived, and graphs of air humidity and of the heat loss in steam-pipes are included.

878. Technische Neuheiten. Der Einfachst-Trockner 'Orkan'. **[Engineering news. The simple 'Orkan' kiln.]** *Holz-Zbl.* 79 (40/41), 1953 (474–5). [G.]

Illustrated description of a 'longitudinal-air-current', unheated, timber-drier. The boards are arranged longitudinally on special aluminium shelf-laths (stickers) so as to form a stack of square section, held firmly between 2 corrugated-iron or other sheets topped with a transverse sheet. The 3 sheets are held together by a few clamps, and form a channel through which air is either blown or sucked by a powerful fan arranged at one end, the air speed reaching 12 m./sec. Softwood boards 24 mm. thick with m.c. above the fibre-saturation point are claimed to lose 1·3% per hour when the outdoor temperature is 4–15° C. A graph shows that 1-in. green Spruce, unedged, has been dried from 86% to 18% m.c. within 63 hours, the energy consumption being 0·8KWH/kg. removed water, at between 4° and 15°.

879. Campbell, G. S., and Wright, G. W. **One-shift versus continuous heating for timber seasoning kilns.** *For. Prod. News Lett. C.S.I.R.O. Aust.* No. 193, 1953 (1–3).

In experiments in drying a slow- and a fast-drying species (*Eucalyptus regnans* and *Pinus radiata* respectively) kilns were either heated continuously over a 24-hr. day or heated for only 8 hr., the vent dampers being set to provide only a very small opening during the period when the heat was off. To dry 1-in. *E. regnans* from green to 12% m.c. took 17 days (414 hr.) by continuous and 30 days (723 hr.) by one-shift drying (mean of winter and summer drying times). In summer 27 days (642 hr.) and in winter 34 days (804 hr.) were needed, using the one-shift method. The summer/winter difference was rather greater during drying to about fibre-saturation point but there was no significant difference, up to this point, between summer one-shift drying and continuous drying. For *P. radiata* the approximate times in drying from green to 14% m.c. were 44 and 99 hours for continuous and one-shift drying respectively. Total heating time for both species was lower for one-shift than for continuous drying, being 60% of the continuous-drying heating time for *E. regnans* and 75% for *P. radiata*; no measurements are available for the saving of steam using the one-shift method. Timber quality was satisfactory by both methods.

880. **Seasoning in superheated steam.** *Rep. For. Prod. Res. Bd., Lond. 1952*, 1953 (12–3).

[Cf. *For. Abstr.* 14 (No. 1681).] Three loads of 2-in. green home-grown Scots Pine were dried, two in superheated steam and one of matched material under the kiln schedule (Schedule 8) normally recommended for the species. In the first superheated-steam run (temperatures 110–117° C.) the Pine dried from an average of 83 to 10% moisture content in about 3 days. It suffered considerably more checking but only slightly more shrinkage and distortion than that dried by Schedule 8. In the second run (108–113°) the final condition was no better. Scantlings of Sitka Spruce were included in this load; these dried without splitting but there was considerable collapse and honeycombing. Loads of 1-in. green and partly-dried Beech seasoned at temperatures above b.p. showed considerable checking and distortion especially in material dried from the green. Loads of Scots Pine boards 1 in. thick were dried quite successfully at 110° in 1½ days as compared with 4 days for matched material by Schedule 8. Results suggest that the normal schedules allow a considerable safety factor in drying some softwoods and possibly light-weight hardwoods, but that the safe margin for hardwoods and species liable to collapse is much smaller.

881. **Robert Hildebrand humid-air super-heat drier HD75.** *Equipm. Note FAO* No. *D*.1.53, 1953. pp. 2.

This kiln, which is transportable, and manufactured by Robert Hildebrand, Oberboihingen Krs, Nürtingen, Württemberg, Germany, can be heated by either steam or electricity. Pine boards 2 in. (5 cm.) thick are dried from 60% to 15% m.c. in 8 hr. 8 min. (actual heating time 6 hr. 2 min.).

882. Eisenmann, E. Leistung und Wirtschaftlichkeit neuer Holztrocknungsverfahren. **[Output and economic aspect of new wood-seasoning methods.]** *Repr.* from *Holz-Zbl.* 78 (76), 1952 (1090–2). [G.]

An illustrated description of the construction and operation of (1) a transverse condensation-type kiln, and (2) a hydro-extractor with spiral air circulation [cf. *For. Abstr.* 13 (No. 1674)] both of the author's design, said to embody the advantages of both the orthodox low-temperature (ca. 65° C.) kilns and those working at temperatures over 100°. Kiln (1) has thermal insulation on all walls and ceiling, electric heating elements near the ceiling, one or more fans forcing the air through the heaters to the timber stack, a condensation plate and a condensation-water trough along the floor on the side farthest from the heating elements, with a single heating element above it. Air coming from the stack towards the condensation trough is unevenly loaded with water vapour, but its relative humidity becomes uniform by passing over the condensation trough with its longitudinal heating element. It is claimed that a kiln of this kind, of 7 cu.m. capacity, is capable at 90–110° of drying 25-mm. Pine timber from 50 to 7% m.c. at a rate of 4%/hour, while Beech 40 mm. thick, when dried at not more than 90°, lost 1%/hour from 40 to 8% m.c. Seasoning costs per 1 cu.m. coniferous wood 24 mm. thick for drying from 35–40 to 8% m.c. amount to DM. 8–15 for ordinary kilns, DM.6–10 for high-temperature all-iron kilns, DM.5·5–7 for transverse condensation type kilns, and DM.5 for hydro-extractors.

883. Suge, K. **Drying of lumbers.** *Japanese Patent* No. 142, Jan. 18, 1952. From *Chem. Abstr.* 47 (11), 1953 (5684*b*). P.R.

Vapour of $CHCl_2CHCl_2$ (I) is introduced into a drying chamber (II) with lumber, then into a condenser (III) where condensed (I) and water are separated, and (I) is vaporized and re-cycled into (II). A 30% NaCl solution heated at 90° C. is sprayed into (II), and then the lumber is dried by heating.

848. *Timberyard Practice. Handling and Storage of Timber*

See also Nos. 342, 748, 834.

884. PECK, E. C. **Storage and handling: machinery and methods used at wholesale and retail yards and consumer plants.** *Sth. Lumberm.* 186 (2333), 1953 (41–7). 3 refs.

885. FRONIUS, K. Verhütung von Rundholzoberflächenrissen durch Wasserberieselung. **[Prevention of surface cracks in roundwood by sprinkling with water.]** *Holz-Zbl.* 76 (97), 1950 (1063–4). [G.]

Recommends water sprinkling, as used with success in some German and Austrian sawmills, and describes the methods of carrying out this treatment in practice.

886. FOLKVARD, E.; LIER, B.; SEEM, M. Bransjemessige undersøkelser av stabling og transport innen sagbruksindustrien. (1) En oversikt. (2) Forskjellige stablemetoder og deres kapasitet. (3) En ekonomisk vurdering av transport- og stablemetoder. **[An investigation on stacking and transport in the sawmilling industry. (1) A general survey. (2) Different stacking methods and their capacity. (3) An economic evaluation of methods of transport and stacking.]** *Norsk Skogind.* 7 (7), 1953 (216–26). [Nor.] P.R.

85. GRADING OF WOOD AND WOOD PRODUCTS

851. *Timber Quality in General*

887. KANO, T., and KABURAGI, Z. **[Forest biological studies on wood quality. (Report 7). The possibility of assessing wood quality from visual characteristics of the bark in Todo Fir.]** *Bull. For. Exp. Sta., Meguro, Tokyo* No. 61, 1953 (57–72 + 24 plates). 2 refs. [Jap.e.]

Examination of a large number of trees of *Abies* sp. showed barks ranging from smooth grey-blue or white on normal growing trees to very rough dark-brown on dead standing trees, and these groups were related to variations in wood structure. Photographs and photomicrographs are given showing variations in bark and wood structure with height in the tree, and in trees with reaction wood and suppressed trees, and bark and wood characteristics for common defects.

852. *Detection, Recognition and Assessment of Injuries and Defects*

See also Nos. 618–23, 723, 762, 782.

888. BANKS, C. H. **Spiral grain and its effect on the strength of South African grown Pines.** *J. S. Afr. For. Ass.* No. 23, 1953 (45–50). 7 refs.

Gives the results of tests to determine the effect of spiral grain on the strength of South-African-grown *Pinus longifolia, P. canariensis* and *P. pseudostrobus*. By limiting the selection of spiral-grained timber to 7° spirality, it is shown that the worst piece of timber will be reduced in strength by 25% relative to that of clear, straight-grained wood, and that the average loss of strength is 6%. [Cf. *For. Abstr.* 13 (No. 4364).]

889. TERRELL, B. Z. **Distribution of tension wood and its relation to longitudinal shrinkage in Aspen.** *Mater. veg.* 1 (3), 1953 (288–99). 6 refs. [E.f.] E.M.B.

The test specimens were taken from 2 butt logs from leaning *Populus tremuloides*. Gelatinous fibres were found on all sides of both logs but the largest concentrations were on upper or tension sides, and coincided to some extent with greater longitudinal shrinkage values. The combined factors of numerous gelatinous fibres and specific gravity jointly affected longitudinal shrinkage, i.e. % of longitudinal shrinkage was greatest in specimens having largest values for sp. gr. and the largest number of gelatinous fibres, with relatively thick cell walls. The small number of specimens tested, however, did not allow the formulation of an equation expressing the 3-dimensional relationship of these factors.

890. ZYCHA, H. Lässt sich das Verstocken des Buchenholzes völlig verhindern? **[Is it possible to prevent the incipient decay of Beechwood?]** *Holz-Zbl.* 76 (126), 1950 (1391). 4 refs. [G.]

'Incipient decay' is not a fungal process, but is associated with the dying-away of the living portions of the wood; this process can be inhibited if the cut surface is coated with a specifically developed preservative that plays, to a certain extent, the part of bark tissue. Results obtained with some of the new preservatives (not specified) are shown in graphs.

853. *Grading of Wood in the Rough*

See also Nos. 586, 741, 750, 893.

891. **Gold Coast: specification of the minimum grade of log for export.** Forestry Department, Accra. 1951. pp. 8 + 4 dgms.

854. *Grading of Converted Timber*

See also Nos. 586, 593, 743–4, 750–1, 763–5, 773–4, 785–7, 790–3.

892. SCHULZ, F. DIN.Deutsche Normen für Holz und Holzverarbeitung. **[German standards for wood and wood processing.]** *Holz Roh- u. Werkstoff* 11 (6), 1953 (241–4). [G.] P.R.

Lists ca. 300 German standards dealing with wood, wood preservation, wood working, joints, and wood products.

893. GALLEGO QUERO, F., and MARTÍNEZ HERMOSILLA, P. Normalización forestal. **[Standardization in forestry.]** II Congreso Nacional de Ingeniería, Instituto de Ingenieros Civiles de España, Madrid 1950, Vol. IV, 1951 (529–64). [Span.]

Discusses standardization in forestry and forest products industries on the basis of French and German work in this field, and outlines 2 proposed standards for Spain: (1) nomenclature of trade

timbers and their assortments, round and sawn, and (2) dimensions of sawn timber.

894. **Interim grading rules for rough sawn Eastern Australian hardwoods.** *Inter. Specif. Stand. Ass. Aust.* No. SAA Int. 360, 1952. pp. 10. Price 3*s*. P.R.

895. **Interim grading rules for rough sawn South Eastern Australian hardwoods.** *Inter. Specif. Stand. Ass. Aust.* No. SAA Int. 361, 1952. pp. 4. Price 3*s*. P.R.

896. **Interim grading rules for rough sawn Eastern Australian brushwoods.** *Inter. Specif. Stand. Ass. Aust.* No. SAA Int. 362, 1952. pp. 10. Price 3*s*. P.R.

86. PULP INDUSTRIES. COMPOSITE MATERIALS MADE WHOLLY OR PARTLY OF WOODY MATTER. CHEMICAL UTILIZATION OF WOOD

See also No. 509.

897. **Congress issue prepared for the symposium on the chemistry of wood and wood constituents being held in Stockholm, July 29–August 3, in connection with the XIIIth International Congress of pure and applied chemistry.** *Svensk PappTidn.* 56 (14), 1953 (509–64). P.R.

Contains the following papers, all in English: The history of the first industrially manufactured sulphite pulp and its introduction into the paper trade market (*G. Spaak*); Some Swedish contributions to wood chemistry: a brief historical survey (*E. Adler*); Characteristic features of modern Swedish cellulose industry (*L. Stockman*); The development of Swedish forest products research (*T. Bergek*); Dissolving wood pulps (*W. L. Améen*); Present tendencies in the development of pulp bleaching (*J. Richter*); The origin and development of the defibrator process (*A. Asplund*); and the Swedish wood pulp industry [giving details of the different mills manufacturing chemical pulp] (*S. Westerberg*).

861. *Pulp and Paper Manufacture. Textile and Other Cellulose Derivatives*

See also Nos. 316–8, 589, 606, 659, 677, 796, 834.

898. WELLWOOD, R. W., and WILSON, J. W. **Current research in wood fibres at the University of British Columbia.** *Pulp Paper Mag. Can.* 54 (7), 1953 (121–4).

Outlines briefly current research on softening materials for microtome sectioning, swelling of cellulosic materials in alcohol, fibre identification, maceration of woody tissues, fibre length measurement, differences between smooth and cork bark of *Abies lasiocarpa* and their effect on pulping, and wood quality of Douglas Fir in relation to conditions in the stand.

899. **Fibre structure in relation to pulp properties.** *Rep. Commonw. sci. industr. Res. Organ. Aust. 1951/2*, 1952 (89).

By taking wood from successive growth rings from a 12-year-old *Pinus radiata*, material was obtained in which the micellar angle decreased and the tracheid length increased from pith to bark, but in which the basic density varied in a random manner. The wood from each growth ring was pulped separately and the pulps were compared. Although tensile strength, bursting strength, and folding endurance all showed definite trends from pith to bark, only tensile strength could be significantly correlated with tracheid length. There was no direct relationship between internal tearing resistance and either tracheid length or micellar spiral angle. In general, good correlations were found between basic density of the wood and most of the properties of handsheets made from the unbeaten pulps.

900. SMITH, E. D., and ROGERS, L. N. **Determination of pentosans in highly purified wood pulps.** *Analyt. Chem.* 25 (6), 1953 (931–3). 4 refs. P.R.

Describes a simple and precise method for the determination of correlation between the pentosans and other properties of highly purified wood pulps, for which the standard Tappi method is not suitable. *From authors' summary.*

901. **Raw materials for more paper: pulping processes and procedures recommended for testing.** *FAO For. For. Prod. Stud.* No. 6, 1953. pp. 172.

Part I, Pulp processes for fibrous raw materials from new sources, contains sections on: fibrous raw materials in current use for pulp and paper; pulping processes for wood; pulping processes for non-wood materials; suitability of fibrous raw materials for different paper products; process cost estimates for pulping fibrous raw materials; case histories (tropical broadleaved woods, straw, sugarcane bagasse, bamboo); general conclusions and recommendations.

Part II, Procedures recommended for the investigation of new fibrous raw materials for paper, contains sections on: collection of samples; raw materials testing procedures; pulping procedures; bleaching; pulp testing procedures.

902. RUNKEL, R. O. H. **Pulp from tropical woods: historical development and results of a research work 1925–1952.** *Mitt. Bundesanst. Forst- u. Holzw.* No. 29, 1952. pp. 85 + 73 photos and gphs. 103 refs. [E.e.]

A comprehensive survey of work by the author and others on pulping of tropical woods, the effect of wood anatomy and chemistry on pulp, and mechanical and physical properties of pulp from different tropical species and mixtures, using different pulping methods.

903. BHAT, R. V., and GUHA, S. R. D. **Indigenous cellulosic raw materials for the production of pulp, paper and board. Part XV. Chemical pulps and writing and printing papers from *Albizzia stipulata*, Boivin.** *Indian For.* 79 (9), 1953 (475–83 + 2 specimen sheets). 3 refs.

Bleached pulps of good whiteness in 47·8–49·0% yield can be prepared from the wood of *A. stipulata* by the sulphate process. The pulps are short-fibred (average fibre-length 1·02 mm.), but white writing and printing papers of good formation and strength can be made from them. Mixture of ca. 30% Bamboo pulp is advisable.

904. **Pulping of New Guinea woods.** *Rep. Commonw. sci. industr. Res. Organ. Aust. 1951/2*, 1952 (88–9).

Some preliminary tests have been made on 4 Mangroves and *Araucaria klinkii*. Of the former, *Excoecaria* sp., *Sonneratia* sp., and *Comptostemon schulzii* produced sulphate pulps of satisfactory average strength. The 4th Mangrove, *Bruguiera gymnorrhiza*, gave a sulphate pulp the handsheets from which had low tensile and bursting strengths. The fibres from this Mangrove are thick-walled and it is probably unsuitable as a pulpwood species. The 3 samples of *A. klinkii* gave sulphate pulps of good over-all strengths comparing favourably with those of imported kraft pulps, but this species appears to be very sensitive to pulping conditions.

905. Amos, G. L. **Sub-projects. W.S. 16–3 General anatomical investigations—inclusions in timber. Progress report No. 2: P.P. 17–0 Miscellaneous tests on the pulping properties of New Guinea timbers. Progress report No. 1: Superficial fleck in handsheets made from the pulp of *Sonneratia acida* L.f.** Division of Forest Products, Commonwealth Scientific and Industrial Research Organization, Melbourne. 1952. pp. 4 + 7 photos. 2 refs. P.R.

A superficial fleck on the wire side of the handsheets was due to vessel elements filled with $CaCO_3$. These elements were present in the wood in localized vasicentric discoloured areas. The fibres and ray cells in these areas were charged with resin, thus indicating that they had been stimulated into rapid metabolic activity during their formative stages: the CO_2 produced accounts for the carbonate deposits in the vessels. *From author's summary.*

906. **Pulping of South-American-grown *Eucalyptus saligna*.** *Rep. Commonw. sci. industr. Res. Organ. Aust. 1951/2*, 1953 (89).

Sulphate pulps prepared from 4-, 6-, and 8-year-old trees of S. American-grown *E. saligna* compared very favourably with standard Eucalypt kraft pulp.

907. Matsunaga, S., and Ishigami, I. **Groundwood pulps from some soft woods.** *Journal of the Japanese Technical Association of the Pulp and Paper Industry, Tokyo* 5, 1951 (18–25). [Jap.] From *Chem. Abstr.* 45 (22), 1951 (10580*f*). P.R.

Presents results of semi-commercial grinding tests on Japanese Pines, Firs, Spruce, Hemlock, Larch and *Chamaecyparis*.

908. Imabashi, Y. **Japanese cedar sulfite pulp.** *Journal of the Japanese Technical Association of the Pulp and Paper Industry, Tokyo* 4 (3), 1950 (25–9). [Jap.e.] From *Chem. Abstr.* 45 (22), 1951 (10577*c-d*). P.R.

Yield of unbleached pulp is 75%. Heartwood is unbleachable, sapwood easily bleached. The pulp is easily beaten; its colour is inferior.

909. Wegelius, T. Aktuella problem vid råvaruanskaffning och -hantering. **[Present problems in obtaining and treating raw materials [for the pulp industry].]** *Pap. ja Puu* 35 (7), 1953 (279–84). [Sw. e.] P.R.

Discusses the possibility of using waste wood and thinnings to reduce costs, the use of portable chippers and mill barking machines, and the value in Finland of such methods as the 'Chemigroundwood' process [cf. *For. Abstr.* 12 (No. 525–6)] and the new 'Va-Purge' process of the Pulp and Paper Research Institute of Canada. This process, which includes pretreatment of chips and rapid cooking (sometimes only 20 minutes) has given good results both with kraft and $NaHSO_3$ cooks, with mixed species (50% Jack Pine, 25% Aspen and 25% Birch), with mixtures of stored and fresh wood, and in the production of corrugating board from straw.

910. **The Va-Purge process in chemical pulping: a symposium presented at the summer meeting of the Technical Association, Canadian Pulp and Paper Association, held at Saranac Inn, New York, June 4–6, 1953.** *Pulp Paper Mag. Can.* 54 (8), 1953 (97–134).

Contains a number of papers (referenced individually), and discussion, on the new process.

911. Ross, J. H. **The Va-Purge impregnation pre-treatment: one solution to the penetration problem.** *Pulp Paper Mag. Can.* 54 (8), 1953 (103–5).

The air is 'purged' from the chips by introducing steam into a pressure vessel and releasing the pressure to a predetermined lower level. This may be repeated as often as is found desirable. As well as removing the air, this treatment permits more efficient diffusion of chemical into the treated tissue, and it was found that when the steam ejected from the purge was condensed, it contained a number of substances that may hinder normal penetration of wood (e.g. in heartwood of Jack Pine). When purging is completed, liquor of a desired composition is run into the digester, without permitting the re-introduction of air. When filled with liquor the digester is brought to a predetermined pressure and further liquid added as necessary. After this penetration cycle, the chips are cooked either by the normal 'liquid phase' cook or by a 'vapour phase' cook. For this latter method the liquor used in the penetration cycle is highly concentrated, so that during penetration enough chemical is taken up for the chips to be pulped, after the removal of any liquor outside the chips, by surrounding them with an atmosphere of steam at the proper pressure.

912. Hart, J. S., and Strapp, R. K. **Adaptation of Va-Purge to chemical pulping with conventional equipment.** *Pulp Paper Mag. Can.* 54 (8), 1953 (105–10).

913. Strapp, R. K. **Applicability of Va-Purge to continuous pulping.** *Pulp Paper Mag. Can.* 54 (8), 1953 (124–5).

914. Hartford, W. G. **Va-Purge and the alkaline pulping of mixed hardwoods.** *Pulp Paper Mag. Can.* 54 (8), 1953 (119–20).

915. Ostrowski, H. J. **Initial investigations of the Va-Purge process for straw pulping.** *Pulp Paper Mag. Can.* 54 (8), 1953 (117–8).

916. Palm, W. H., and Ostrowski, H. J. **Use of the Va-Purge process in straw pulping for corrugating board manufacture.** *Pulp Paper Mag. Can.* 54 (8), 1953 (111–6). 1 ref.

917. Migita, N., Hosoi, T., and Nakano, J. **Fundamental studies on pulpification [pulping] of broadleaf wood. I. Linkage between alkali and xylan.** *Journal of the Society of Textile and Cellulose*

Industry, Japan 6, 1950 (394–8). [Jap.?] From *Chem. Abstr.* 46 (12), 1952 (5838*f*). P.R.

918. MIGITA, N., NAKANO, J., and GODAI, R. **Fundamental studies on pulpification of broadleaf wood. II. Xanthation of alkali xylan.** *Journal of the Society of Textile and Cellulose Industry, Japan* 6, 1950 (398–400). [Jap.?] From *Chem. Abstr.* 46 (12), 1952 (5838*g*). P.R.

919. MIGITA, N., HOSOI, T., and HIGAKI, R. **Fundamental studies on pulpification of broadleaf wood. III. Purification of Beech-wood pulp by screening.** *Journal of the Society of Textile and Cellulose Industry, Japan* 7, 1951 (88–92). [Jap.?] From *Chem. Abstr.* 46 (12), 1952 (5838*h*). P.R.

920. RUNKEL, R. O. H., SCHAMBACH, H., and WITT, H. Über den Einfluss der Temperatur bei der Herstellung von Halbzellstoffen aus Laubhölzern im alkalischen Verfahren. Erste (vorläufige) Mitteilung. **[Effect of temperature on the manufacture of semichemical pulp from broadleaved species in the alkaline process. First (preliminary) communication.]** *Holzforschung, Berlin* 7 (1), 1953 (9–12). 3 refs. [G.g.e.] P.R.

Semichemical pulp obtained by mild alkaline treatment (10% of NaOH) of Beech, followed by grinding, was tested for brightness and strength, the digestion temperatures being 20, 70, 100, and 150° C. The lowest of these temperatures yields a very bright pulp, and the pulp obtained by treatment at 100° has a very high tearing strength.

921. SAWADA, H. **The neutral sulfite semichemical pulping of Beech.** *Journal of the Japanese Technical Association of the Pulp and Paper Industry, Tokyo* 5, 1951 (211–9). [Jap.e.] From *Chem. Abstr.* 45 (22), 1951 (10577*d-e*). P.R.

922. DAIMON, T., and AMINO, Y. **Neutral sulfite semichemical pulp from hardwood. III. Study on cooking.** *Journal of the Japanese Technical Association of the Pulp and Paper Industry, Tokyo* 5, 1951 (104–7). [Jap.?] From *Chem. Abstr.* 45 (22), 1951 (10577*i*–10578*a*). P.R.

Presents results of test cookings with Birch, Beech, and Lime.

923. DAIMON, T., and AMINO, Y. **Neutral sulfite semichemical pulp from hardwood. IV. Study of bleaching.** *Journal of the Japanese Technical Association of the Pulp and Paper Industry, Tokyo* 5, 1951 (401–5). [Jap.e.] From *Chem. Abstr.* 46 (3), 1952 (1254*i*). P.R.

Presents results obtained with Birch neutral sulphite semichemical pulp.

924. IIZUKA, N. **A study of the alkali digestion of Birch bark.** *Bull. Tokyo Univ. For.* No. 44, 1953 (205–14). 11 refs. [E.e.jap.]

Discusses the relationship between yields and alkali concentration, time of pulping, temperature, and volume of pulping liquor for pulps of bark from *Betula maximowicziana, B. latifolia* and *B. ermanii* var. *communis*.

925. SUREWICZ, W. **Sulfate pulping of prehydrolysed Pine wood.** *Prace Inst. Celuloz.-Papier.* 1, 1952 (17–31). [Pol.] From *Chem. Abstr.* 47 (13), 1953 (6654*d-e*). P.R.

The best kraft pulping conditions were: initial temperature 60–70° C., max. temperature 170–173°, time to the max. temperature 2 hours, cooking time at the max. temp. 3 hours, active alkali 21% Na_2O based on wood, and liquor/wood ratio 4/1–5/1.

926. BLAGOJEVIĆ, D. Bukovo drvo kao celulozna sirovina. **[Beech wood as raw material for cellulose.]** *Šumarstvo* 6 (1), 1953 (1–10). 12 refs. [Serb.f.]

About ⅔ of the present output of the Jugoslav paper industry (98,000 tons) is met by home-grown pulpwood. Since the viscose rayon industry is to consume ca. 20,000 tons, and paper production is expected to rise soon to ca. 150,000 tons, the use of Beech as a major raw material for paper and the sole raw material for the viscose industry is inevitable. Beech forests of Jugoslavia have an annual production of some 350,000 cu.m. of pulpwood, equivalent to 70,000 tons of pulp.

927. BARTUNEK, R., and JANCKE, W. Untersuchungen über die Struktur nativer Cellulosefasern Teil I. Technische Beobachtungen und analytische Methoden aus der Viskoseindustrie. **[Investigations on the structure of native cellulose fibres. Part 1. Industrial observations and analytical methods in the viscose-rayon industry.]** *Holzforschung, Berlin* 7 (2/3), 1953 (71–8). 5 refs. [G.g.e.] P.R.

Discusses the differences in the behaviour of Spruce and Beech sulphite pulps as raw material for viscose rayon manufacture, and shows the way to determine and interpret these differences.

928. NISHIDA, K., and WATABE, T. **[The effects of seasoning in the sulfite digestion of *Larix leptolepis*.]** *Journal of the Japanese Technical, Association of the Pulp and Paper Industry, Tokyo* 5, 1951 (539–52, 626). [Jap.e.] From *Chem. Abstr.* 46 (9), 1952 (4224*h*–4225*a*). P.R.

After separate seasoning of sapwood and heartwood sawdust for 6–12 months, the galactans and mannans increased, the total cellulose slightly decreased, and the pentosans and lignin remained unchanged. In the sulphite digestion, the yields of pulp and the total cellulose in the pulp were greatly increased.

929. MIGITA, N., NAKANO, J., and TOROI, T. **[The antipulping effect of the flavanone of Larch heartwood in sulfite cooks.]** *Journal of the Japanese Technical Association of the Pulp and Paper Industry, Tokyo* 5, 1951 (399–401). [Jap.e.] From *Chem. Abstr.* 46 (3), 1952 (1254*g-h*). P.R.

The flavanone in Larch heartwood was shown to be 3,3′, 4′,5,7-pentahydroxyflavanone, the same as in Douglas Fir. The results of sulphite cooks with Larch heartwood and Spruce wood indicated that flavanone from the former had the expected antipulping effect.

930. MIGITA, N., NAKANO, J., SAKAI, I., and ISHI, S. **[The antipulping effect of the flavanol of Larch heartwood in the sulfite cook.]** *Journal of the Japanese Technical Association of the Pulp and Paper Industry, Tokyo* 6, 1952 (476–80, 543). [Jap.e.] From *Chem. Abstr.* 47 (13), 1953 (6655*b-d*). P.R.

In addition to previous research it was found that (1) isolated native lignin did not form a condensation

product with flavanol; (2) quercetin was obtained in yield of 65% by the sulphite cooking of isolated flavanol, and a large amount of quercetin was also obtained from the waste liquor in a normal sulphite cook of Larch heartwood, and (3) the yellow colour of the pulp seems to be due to quercetin.

931. Wacek, A., and Meralla, S. Faserverfilzung und Faserverklebung. [**Fibre felting and fibre bonding.**] *Holzforschung, Berlin* 6 (3), 1952 (65–70). 15 refs. [G.g.e.] P.R.

Discusses the phenomena assumed to be responsible for the bonding of fibres in paper. Hemicelluloses are the bonding constituent, while lignin has a fixing effect due to its thermoplastic properties.

862. *Composite Materials made Wholly or Partly of Woody Matter*

See also No. 772.

932. **Building boards from bark-sawdust-paraformaldehyde mixtures.** *Aust. Timb. J.* 19 (4), 1953 (293 . . . 297).

Satisfactory boards were obtained from *Pinus radiata* bark and sawdust and from *Eucalyptus crebra* bark with mixed hardwood sawdust. Optimum pressing conditions were 300 lb./sq. in., 130° C. and 6 min. A moisture content of 17·5% for the mixture before pressing seemed to give the best results, but with *P. radiata* mixtures up to 25% m.c. could be used when the boards were allowed to mature. Figures for the effect of m.c. on board properties are given in graphs. As little as 20% bark content gives boards with good strength properties; these increased with bark content up to 80%.

933. Goodfellow, G. D. **Plaswood, new high density chipboard.** *J. For. Prod. Res. Soc.* 3 (2), 1953 (76, 90–1). I.F.B.

Its manufacture, properties and uses. [Cf. *For. Abstr.* 14 (No. 2868).]

934. Voelskow, P. Die Bearbeitung und Verbindung von Holzspanplatten. [**Machining and joining of chipboards.**] *Holz-Zbl.* 76 (108), 1950 (1173–4). [G.]

935. Stillinger, J. R., and Johnson, J. W. **Effect of size and shape on percentage water absorption in ten different types of commercial hardboards.** *J. For. Prod. Res. Soc.* 3 (2), 1953 (66–9). [Oregon Forest Products Laboratory, Corvallis.] I.F.B.

Ten different types of commercial hardboard were tested for the effect of test-specimen size and shape on % water absorption in a 24-hr. water-absorption test. The specimens were 12 × 12 in., 6 × 6 in., 3 × 3 in., 4 × 9 in. and 2 sets of 3 × 12 in. Conclusions from an analysis of results, are that any specimen size having a surface area of 72 sq. in. (face plus back) between the limits 3 × 12 in. and 6 × 6in. would serve for tests of both treated and untreated hardboards in nominal thicknesses $\frac{1}{8}$ and $\frac{1}{4}$ in. It is not usually necessary to consider direction of testing when a shape other than a square is used. These results suggest the desirability of revising the current tentative A.S.T.M. Standard (D 1037–52 T) which permits the use of either a 12 × 12 or a 6 × 6 in. specimen.

936. Stillinger, J. R. **Effect of head speed and span on modulus of rupture in several types of commercial hardboards.** *J. For. Prod. Res. Soc.* 3 (2), 1953 (70–5, 90). 6 refs. [Oregon Forest Products Laboratory, Corvallis.] I.F.B.

After a large number of tests on a wide variety of boards, it is concluded that it would be advisable to change the static-bending test procedure in the current A.S.T.M. tentative standard (D 1037–52 T) and to recommend the use of a 6-in. span and any headspeed in the range 0·50–2·00 in./min. for all commercial hardboards regardless of thickness or class of board.

937. **Use of Stringybark in fibrous plaster.** *Aust. Timb. J.* 19 (4), 1953 (311).

Experiments have shown that Stringybark (*Eucalyptus eugenioides*) bark fibres can be used either to replace sisal or in equal mixture with it. A slightly larger amount of Stringybark is needed to give a board of equal strength. Fibrous plaster sheets from Stringbybark fibre are less flexible and do not sag as readily. The fibre is prepared by retting for 3–5 weeks and teasing.

938. **Fibre building boards.** *Brit. Stand.* No. 1142, 1953. pp. 22. Price 4*s.* P.R.

939. **Production of fibreboards from secondary colonial timbers.** *Rep. For. Prod. Res. Bd., Lond. 1952*, 1953 (40–1).

A method of extraction in simple apparatus with alcohol vapour removes practically all the alcohol-soluble material from full-size cooking chips of Wallaba [*Eperua* sp.] in a short time. Boards of high strength (modulus of rupture 10,000–11,000 lb./sq. in.) are produced; their water absorption is considerably higher than that of boards made from unextracted wood but small additions of rosin size to the pulp diminish it. Boards with water-absorption values low enough to comply with the requirements of *Brit. Stand.* 1142 (Draft Revision CM (TIB) 8131) have also been made by incorporating small quantities of wax emulsions. Both methods of sizing caused slight strength loss, but boards were still above the specified minimum value for modulus of rupture. Prolonged heat treatment after pressing considerably improved the water resistance of unsized boards without loss of strength properties, but so far the wax-emulsion treatment has proved more reliable. [Cf. *For. Abstr.* 14 (No. 1716).]

Morabukea [*Mora gonggrijpii*], although hard and of high density (60–65 lb./sq. in.) gave satisfactory pulping chips, best results being obtained with wood at a moisture content of not less than 35–45%. Board of satisfactory strength (modulus of rupture 8000–10,000 lb./sq. in.) and of pleasing appearance have been made by using a cooking schedule similar to that for Wallaba. Water-absorption values, as high as or higher than those for extracted Wallaba, could be reduced to meet the specified requirements for standard hardboard by small additions of a proprietary wax-emulsion size.

Similar results to those for Wallaba were obtained by heat treatment.

In experiments on the practical lower limit of chemical consumption, using Morabukea chips, satisfactory results were obtained with a consumption of 5% Na_2SO_3 and 2·5% $NaHCO_3$ (based on dry weight of wood). Cooking for 1 hour at 180° C. was sufficient, and pressures of about 200 lb./sq. in. were maintained in the digester owing to the combined effect of steam and CO_2 produced during the reaction. Boards from pulps cooked with less than 5% Na_2SO_3 were insufficiently strong even when the pH of cooking liquors was kept up by adding other alkalis. Similar results are expected for Wallaba. It is thought that a disc mill will be more efficient than a beater for defibering the cooked chips and may further reduce consumption of chemicals.

940. **Producing board from wood waste.** *Cabinet Mkr.* 1953 (2801), (1132–3). P.R.

A brief description of the manufacturing process and properties of the 'Bartrev' fibreboard, consisting of ca. 95% comminuted softwood shavings and 5% of quick-setting resin binder.

941. Mii, M. **Studies on hardened fiber-boards. VII. Beating in the manufacture of groundwood fiberboards by the wet process. IX. Chemical treatments of groundwood fiber-boards [manufactured] by the wet process [: a substitute for rosin soap and paraffin as the waterproofing re-agent].** *Wood Industry* [, *Japan*] 6, 1951 (350–3; 459–62). From *abstrs.* in *Rec. Res. Fac. Agric. Univ. Tokyo* No. 2, 1951/52 (1953), (77–8). [E.]

942. Jagielski, A. Badania nad odpornością płyt pilśniowych na działalność grzybów *Coniophora cerebella* i *Merulius lacrymans*. **[Research on the resistance of fibreboards to *C. cerebella* and *M. lacrymans*].** *Sylwan* 97 (2), 1953 (124–35). 11 refs. [Pol.]

Tabulates results of mycological tests conducted on 5 × 2·5 cm. sections of fibreboard of different degrees of compression, and on 5 × 2·5 × 1·5 cm. control blocks of Pine wood. Fibreboards have been found to succumb to *C. cerebella* and *M. lacrymans* much more readily than untreated Pine. Bituminizing (impregnating) of fibreboard only very slightly reduces the fungus attack. Hardboards are also much less resistant than Pine.

943. **New process turns wood waste into battery separators.** *Wood, Chicago* 58 (5), 1953 (28–9). P.R.

Brief description of a new process for manufacturing (by a kind of wet pulping) battery separators in the form of a continuous strip, from Douglas Fir wood waste.

865. *Plastics*

944. Dickinson, T. A. **Smart new tableware made from wood scraps.** *Wood, Chicago* 58 (2), 1953 (32, 34). P.R.

A brief account of the manufacture of 'Flintwood' and of tableware (dishes etc.) made of this material. It consists of 80% wood flour, the rest being a thermosetting resin. The moulding temperature is 325° F., moulding pressure 2500–3000 lb./sq. in.

867. *Destructive Distillation*

945. Reynolds, L. **The manufacture of wood charcoal in Great Britain.** *For. Rec. For. Comm., Lond.* No. 19, 1953. pp. 12 + 14 photos. Price 1*s.* 3*d.*

Notes on methods, species used, uses, consumption, prices etc.

946. Miyake, I., and Sugiura, G. **[Research on Bamboo charcoal: the dry distillation of Bamboo culms, and products from it. (1st report).]** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 62, 1953 (7–20). 22 refs. [Jap.e.]

Properties of charcoal, tar and vinegar from 6 species of Bamboo are shown in graphs and tables with English legends, and properties of Bamboo and wood charcoals are compared. As these are very different, it is preferable to use Bamboo charcoal as active carbon, and to use Bamboo vinegar and tar in combination with pulp manufacture. Because of the large area covered by *Sasa paniculata* and of the need to destroy it, charcoal burning should be done on farms and in forest villages.

947. Es. Die Vergasung von Sägespänen zur Gewinnung von Energie. **[Gasification of sawdust as a source of mechanical power.]** *Holz-Zbl.* 76 (141), 1953 (1585–6). [G.]

Illustrated description of a German gas-producer working on sawdust only. The operation, output, efficiency, and uses are discussed in some detail.

89. OTHER ('MINOR') FOREST PRODUCTS

See also Section 28.

892. *Vegetable Products*

See also No. 103.

948. Díaz Ungría, C. El M.A.C. colabora en la investigación de la naturaleza. **[The Ministry of Agriculture collaborates in the study of nature.]** *Agric. venez.* 17 (159), 1953 (11–8). [Span.] E.M.B.

Notes on an expedition of the La Salle Natural History Society to the Orinoco Delta, including an account of the many uses of the palm, *Mauritia flexuosa.*

892.4. Bark Products. Tanstuffs. Cork

See also Nos. 677, 733, 924, 932, 937.

949. **Survey of tannin content of bark of plantation-grown *Pinus radiata* at Jenolan State Forest, N.S.W.** *Aust. Timb. J.* 19 (4), 1953 (297 . . . 301). 4 refs.

Bark samples were collected from trees planted between 1929 and 1935 (8 trees from each year's planting) at 3–4 ft. 6 in., 15–16 ft. 6 in., and 30–31 ft. 6 in. from the ground and at 10–11 ft. 6 in. from the top of the tree, and were analysed for tannin content. Results, which are tabulated, show that the bark of plantation-grown *P. radiata* could be a valuable source of vegetable tannin. The average tannin content of the 56 butt-bark samples was 16·4%, the content decreasing with height up the tree. There was no variation of tannin content with age.

950. Schimitschek, E. *Stephanopachys substriatus* Payk. (Bostrychidae) als Zerstörer von

Fichtengerbrinde. [***S. substriatus* as a destroyer of Spruce tanbark.**] *Anz. Schädlingsk.* 26 (8), 1953 (119–21). 6 refs. [G.]

Notes on the beetle, which was found in 1952 in bark from Mattighofen (Upper Austria). Infested bark appears to suffer no tannin loss.

951. Sułkowski, M. Leszczyna jako surowiec garbnikowy. [***Corylus avellana* as a tannin source.**] *Sylwan* 97 (2), 1953 (135–9). 5 refs. [Pol.]

Results of an investigation show that Hazel leaves cannot be advantageously utilized as a tannin source, but the bark of Hazel, with a tannin content of ca. 8% and a slightly smaller non-tannin content, can be utilized for this purpose, because of a relatively good tannin/non-tannin ratio.

952. Sidey, J. L. **An anatomical study of the Black Wattle tree (*Acacia mollissima*, Willd.) of the eastern Transvaal with special reference to the distribution of tannin.** *J. S. Afr. For. Ass.* No. 23, 1953 (13–29). 4 refs.

Tannin is found in all the organs of the Wattle tree, but is confined to certain tissues (the epidermis, phloem parenchyma, medullary rays and outer pith parenchyma). It is not found in the xylem, pericycle, cambium, sieve tubes and companion cells, central pith parenchyma and bast fibre-bundles. The use of Němec's killing fluid for precipitating the tannin is highly recommended, together with Delafield's haematoxylon stain for differentiation, as this method allows a rapid check on any organ for the presence of tannin, which will be shown as yellow-brown spherical aggregations within the vacuoles of the cells. The killing fluid is prepared at the time it is to be used, by mixing 50 c.c. of a 1% $K_2Cr_2O_7$ solution, 50 c.c. of a 1% H_2CrO_4 solution, and 8 c.c. of a 40% formaldehyde solution (neutralized by adding some powdered chalk).

953. Howes, F. N. **The *Caesalpinias* as tanning materials.** *Mater. veg.* 1 (1), 1952 (60–74). 18 refs. [E.f.] E.M.B.

Notes on different species of *Caesalpinia* as producers of tannin, their countries of origin and the state of the industry in these countries.

954. Perrier de la Bathie, H. Sur les utilités de l'*Adansonia grandidieri* et les possibilités de culture. [**The uses of *A. grandidieri* and the possibility of cultivating it.**] *Rev. int. Bot. appl. Agric. trop.* 32 (355/356), 1952 (286–8). [F.] P.R.

Discusses briefly the value of *A. grandidieri* both for oil seeds and bark fibres and describes a small-scale experiment on sowing *A. madagascariensis*, *A. za*, *A. alba* and *A. grandidieri* near Majunga in 1910. The trees obtained were removed in 1933 but results till then showed that these species were easily grown from seed and grew rapidly in Madagascar. [Cf. *For. Abstr.* 15 (No. 117).]

955. Shibamoto, T., Minami, K., Masutani, T., and Kubota, S. [**Composition of bark of Birches from Hokkaido.**] *Bull. Tokyo Univ. For.* No. 44, 1953 (201–4). 8 refs. [Jap.e.]

The composition of the outer barks of *B. latifolia*, *B. maximowicziana* and *B. ermanii* var. *communis* from the Tokyo University forests was determined by ordinary methods of wood analysis. The amounts of alcohol-benzene extractives decreased and of 1% NaOH extractives, Cross and Bevan cellulose and Klason lignin increased in the species in the order given. The presence in all analyses of traces of methoxyl throws some doubt on the presence of lignin. [Results are given in tables with English legends.] *From authors' summary.*

956. Bhattacharji, S., Mitra, C., and Siddiqui, S. **Chemical examination of the trunk bark of Nim (*Azadirachta indica* syn. *Melia azadirachta*).** *J. sci. industr. Res., India* 12*B* (4), 1953 (154–6). 4 refs. D.S.I.R.

The nimbin series of bitters, the characteristic essential oil and nimbosterol have been isolated from the trunk bark of *M. azadirachta*.

957. Mitra, C., Rao, P. N., and Siddiqui, S. **Chemical examination of the root bark of Nim (*Azadirachta indica* syn. *Melia azadirachta*).** *J. sci. industr. Res., India* 12*B* (4), 1953 (152–3). 4 refs. D.S.I.R.

The content of nimbin and nimbinin in the solvent-extracted Nim oil varies within very wide limits; it is sometimes nil.

892.5. Medicinal Plants, Edible Plants, Insecticides from Plants, etc.

See also Nos. 956–7.

958. Diapoulis, C. Le Styrax en Grèce. [**Styrax in Greece.**] *Mater. veg.* 1 (1), 1952 (119–21). [F.e.] E.M.B.

A map is presented with comments, showing the distribution of *Styrax officinalis* and *Liquidambar orientalis* in Greece.

959. Biswas, K. ***Rauwolfia* drug.** *Sci. & Cult.* 18 (12), 1953 (579–81). E.M.B.

Describes *R. serpentina* and *R. canescens*, and discusses their distribution in India, their chemical constituents and their use in medicine.

960. Schlittler, E., and Furlenmeier, A. Über Alkaloide aus *Rauwolfia sempervirens* Schlechter. [**Alkaloids from *R. sempervirens*.**] *Helv. chim. Acta* 36 (5), 1953 (996–9). 6 refs. [G.g.] O.R.S.

Two new alkaloids were isolated. [Cf. *For. Abstr.* 14 (Nos. 1756–7).]

961. Bodendorf, K., and Eder, H. Raupin, ein neues Alkaloid aus *Rauwolfia serpentina*. [**Raupin, a new alkaloid from *R. serpentina***] *Naturwissenschaften* 40 (12), 1953 (342). [G.] [Technische Hochschule, Karlsruhe.] O.R.S.

962. Stoll, A., and Hofmann, A. Sarpagin, ein neues Alkaloid aus *Rauwolfia serpentina* Benth. [**Sarpagin, a new alkaloid from *R. serpentina*.**] *Helv. chim. Acta* 36 (5), 1953 (1143–7). 9 refs. [G.g.] O.R.S.

963. Lamberton, J. A., and Price, J. R. **Alkaloids of the Australian Rutaceae: *Medicosma cunninghamii* Hook. F.** *Aust. J. Chem.* 6 (2), 1953 (173–9). 11 refs. P.R.

964. McKenzie, A. W., and Price, J. R. **The alkaloids of *Gyrocarpus americanus* Jacq.** *Aust. J. Chem.* 6 (2), 1953 (180–5). 14 refs. P.R.

965. Chakravarti, R. N., and Chakravarti, S. C. **Alkaloids of *Glycosmis arborea* Correa.** *Sci. & Cult.* 18 (11), 1953 (539–40). 5 refs. E.M.B.

966. Chatterjee, A., and Majumdar, S. G. **Glycosin, the new alkaloid of *Glycosmis pentaphylla*, Correa.** *Sci. & Cult.* 18 (12), 1953 (605–6). 9 refs. E.M.B.

Cf. *For. Abstr.* 14 (Nos. 866, 1766).

967. Krüpe, M. Hämagglutinine mit spezifischen Affinitäten in Samen von Papilionaceen. [**Haemagglutinins with specific affinities in seeds of Papilionaceae.**] *Biol. Zbl.* 72 (7/8), 1953 (424–31). 22 refs. [G.g.] E.M.B.

Lists the results of investigations of seed extracts of 167 species of Papilionaceae.

892.6. Resin and Turpentine. Essential Oils. Fixed Oils and Fats. Gums. Latex. Dyestuffs. Sap Sugar

See also Nos. 300, 303–4, 599, 954, 956–7, 1011.

968. Pomeroy, K. B. **Forest research progress.** *Naval Stores Review International Yearbook, New Orleans, La.* 1953 (77–80).

A summary of research in the field of resin production and processing now in progress at the Lake City Research Centre of the Southeastern Forest Experiment Station.

969. Muttoo, O. N. **Naval stores industry.** *Indian For.* 79 (7), 1953 (390–4). 9 refs.

Notes on the world position, with special reference to the Indian industry—tapping and collection, processing, and organization of the industry, for which the author makes suggestions.

970. Mirov, N. T. **Chemical aspects of *Diploxylon* Pines.** *Z. Forstgenet.* 2 (5), 1953 (94–6). 38 refs. [E.g.]

The subgenus *Diploxylon* was investigated for turpentine composition, and a classification according to these properties, which agrees largely with Shaw's, is presented. It differs in some respects from the genetical classification of Duffield. [Cf. *For. Abstr.* 14 (No. 89).]

971. Iloff, P. M., Jr., and Mirov, N. T. **Composition of gum turpentines. XVII. A report on *Pinus montezumae* from Chiapas and *P. oocarpa* var. *trifoliata* and *P. durangensis* from Durango, Mexico.** *J. Amer. pharm. Ass. (sci. Ed.)* 42 (8), 1953 (464–7). 5 refs. O.R.S.

Gives analyses of the turpentines of the 3 Pines, and discusses their significance in determining the relationships between these and other species and varieties. [Cf. *For. Abstr.* 14 (Nos. 3992–3).]

972. Bardyšev, I. I. β-mircen—sostavnaja častj skipidarov iz sosny obyknovennoĭ *Pinus silvestris*. [**β-myrcene—a component of turpentines from *P. sylvestris*.**] *Dokl. Akad. Nauk SSSR* 71 (4), (673–5). 10 refs. [Russ.] A.P.B.

973. Verghese, J., and Yeddanapalli, L. M. **Studies in oil of *Pinus longifolia* Roxb.: III—two-directional fission of cyclopropane ring of 3-carene in sulphur aromatization.** *J. sci. industr. Res. India* 12*B* (3), 1953 (121). 3 refs. D.S.I.R.

974. Krishnan, T. S. S., Verghese, J., and Yeddanapalli, L. M. **Studies in oil of *Pinus longifolia* Roxb.: IV—isomerization of 3-carene to α-terpinene.** *J. sci. industr. Res., India* 12*B* (3), 1953 (122). 1 ref. D.S.I.R.

975. Shibamoto, T., Minami, K., and Yamada, M. [**Studies on Todomatsu balsam—III. Observations on the properties of rosin of Todomatsu balsam.**] *Bull. Tokyo Univ. For.* No. 44, 1953 (233–5). 3 refs. [Jap.e.]

The solubility of rosin of Todomatsu balsam [resin of *Abies* spp.] was determined. [Cf. *For. Abstr.* 13 (No. 812).] *Authors' summary.*

976. Neybergh, A. G. Quelques plantes à essences dans l'Est de la Colonie (suite et fin). [**Some plants grown for their essential oils in the east of the Belgian Congo (continued and concluded).**] *Bull. agric. Congo belge* 44 (2), 1953 (319–66 + 1 tbl.). 39 refs. [F.flem.]

Includes a section on *Cupressus sempervirens*. [Cf. *For. Abstr.* 14 (No. 2916).]

977. Murray, J., and Stanley, B. G. **The essential oil of *Nothopanax simplex*.** *J. appl. Chem.* 2 (1), 1952 (5–7). 12 refs. P.R.

The oil consists largely of myrcene, with smaller amounts of other identified and unidentified terpenes and sesquiterpenes, and paraffin wax.

978. O'Brien, K. G., Penfold, A. R., and Werner, R. L. **The essential oil of *Myoporum crassifolium* Forst.** *Aust. J. Chem.* 6 (2), 1953 (166–72). 11 refs. P.R.

The oil is shown to consist principally of a tertiary sesquiterpene alcohol which is either identical or isomeric with synthetic bisabolol. *From authors' summary.*

979. Hirst, E. L., and Dunstan, S. **The structure of Karaya gum (*Cochlospermum gossypium*).** *J. chem. Soc.* August, 1953 (2332–7). O.R.S.

892.7. Fruits, Seeds, Fibres, Yarns and Flosses

See Nos. 599, 954.

892.8. Heather. Broom, etc. Osiers. Canes and Bamboos. Reeds and Rushes. Thatching Materials

See also No. 946.

980. Purushotam, A., and Rana, K. S. **Treatment against decay and fire of grasses and palmyra leaves used for thatching roofs.** *Indian For. Leafl.* No. 133, 1953. pp. 5. 2 refs. *Repr.* from *Indian For.* 79 (4), 1953 (243–7).

9. FORESTS AND FORESTRY FROM THE NATIONAL POINT OF VIEW. SOCIAL ECONOMICS OF FORESTRY

90. GENERAL

See also No. 579.

981. **Report to the Food and Agriculture Organization by the United Kingdom for 1952–53.** FAO National Committee for the United Kingdom, London. 1953. pp. 39 + 1 tbl.

Includes notes on forestry policy for the U.K. and for the British Colonial Territories.

982. KERNAN, H. S. **Forest conservation for Iran.** *Foreign Agric.* 17 (5), 1953 (91–2). E.M.B.

Notes on present over-exploitation of the Caspian forests, mainly for charcoal production, its causes and possibilities of control.

983. **Progress report on forestry and forest products by Burma.** *Docum. FAO Asia-Pacif. Comm. 1952* No. 58, 1952. pp. 7. Limited distribution: FAO, Rome.

984. TAMESIS, F. **Summary of first progress report on Philippine forestry.** *Docum. FAO Asia-Pacif. For. Comm. 1952* No. 40, 1952. pp. 5. Limited distribution: FAO, Rome.

985. **Progress report of the forest service of Netherlands New Guinea.** *Docum. FAO Asia-Pacif. Comm. 1952* No. 66, 1952. pp. 5. Limited distribution: FAO, Rome.

902. *History of Forests and Forestry*

See also Nos. 158–66, 203, 242, 362, 575.

986. BERTSCH, K. Geschichte des deutschen Waldes. **[The history of Germany's forests.]** Verlag von Gustav Fischer, Jena. 4th ed. (rev.) 1953. pp. 124. 29 refs. [G.] Price *DM*.7·80 [16*s*. 0*d*.].

Cf. *For. Abstr.* 12 (No. 1693).

987. KLAEHN. Zur Geschichte des Ausländeranbaus in Deutschland. **[History of the planting of exotic species in Germany.]** *Holz-Zbl.* 79 (99), 1953 (1073–4). 15 refs. [G.]

988. LAURE, G. I boschi siciliani nella preistoria, nella storia, nell'attualità. **[The forests of Sicily in prehistory and history, and at the present time.]** *Monti e Boschi* 4 (6), 1953 (253–61). [It.f.e.]

989. WEISZ, L. Ergebnisse einer schweizerischen Forstenquete vor 110 Jahren. **[Results of a Swiss forest questionnaire of 110 years ago.]** *Schweiz. Z. Forstw.* 104 (7/8), 1953 (309–20). [G.f.]

Gives the answers, by cantons, to 6 questions on forest area, exploitations, exports, and imports of wood, from a general economic enquiry made in Switzerland in 1842.

990. CROSBY, W. **Forestry in the 49th State.** *Amer. Forests* 59 (7), 1953 (20–2, 43–5).

Notes on the history of forestry in Hawaii.

903. *Forest Policy, General*

991. GILL, T. **Forest policy and program for Taiwan.** Joint Commission on Rural Reconstruction, Taipei, Taiwan. 1952. pp. 21 + 15. [E.Chin.]

992. **General [forest] policy and legislation in Indonesia.** *Docum. FAO Asia-Pacif. For. Comm. 1952* No. 70 (A). [1952]. pp. 17.

A review, with particular reference to Java and Madura, and divided into the periods 1800–65, 1865–97, and 1897 to the present day. Excerpts from a draft Forest Law (1952) for the Outer Territories are given.

993. MARSHALL, C.; THOMPSON, T. S. **Forestry in Western Samoa.** Government of Western Samoa. 1950. pp. 63 + map + 12 photos.

A report on forestry with recommendations for forest policy.

904. *General Regional Accounts of Forests and Forestry*

See also Nos. 182–3, 988, 993, 1011.

994. VENET, J. Forêts finlandaises. **[Finnish forests.]** *Rev. for. franç.* 5 (6), 1953 (421–9 + 16 photos. [F.]

Notes on Finnish forests and forestry with particular emphasis on transport.

995. CHATURVEDI, M. D. **Report on the forests of Saurashtra.** Govt. of India Press, New Delhi. 1953. pp. 12 + 3 photos.

996. **Thailand and her agricultural problems.** Ministry of Agriculture, Bangkok. Revised ed., 1950. pp. 139 + 29 photos + 2 gphs. + 10 maps. [E.]

Revision of the 1949 publication compiled by the national FAO committee. Includes a chapter on Forest Resources. [Cf. *For. Abstr.* 10 (No. 2404).]

997. BROWN, C. H. **Tree growing and forestry in Morocco.** *World Crops* 5 (4), 1953 (141–2). O.R.E.

Notes on the wooded ranges of the Atlas mountains, the Cork Oak, *Argania*, and *Eucalyptus* stands of Morocco, and possibilities for further afforestation.

998. VOGEL, F. H. **Forestry in Honduras.** Division of Agriculture and National Resources, Institute of Inter-American Affairs, Technical Cooperation Administration, Washington, D.C. 1952. pp. 18.

999. LAMPRECHT, H. Waldbauliche Aufgaben und Probleme in Venezuela. **[Forestry problems in Venezuela.]** *Schweiz. Z. Forstw.* 104 (9), 1953 (428–43). 14 refs. [G.g.f.]

1000. SOEPARDI, R. Object exploitasi hutan Samarinda. **[The forests of Samarinda and their exploitation.]** *Rimba Indonesia* 2 (1/2), 1953 (2–57 + 3 tbls. + 1 map). [Jav.du.e.]

Presents results of a survey on forest area and amounts of timber of different species and assortments, and makes recommendations on logging, transport, export and establishment of sawmills.

1001. **Forestry in New Zealand. (Extract from New Zealand Official Year-Book.)** *Inform. Ser. N.Z. For. Serv.* No. 1, 1953. pp. 27 + 4 photos.

1002. CASSON, P. B. **The forests of Western Tasmania.** *Aust. For.* 16 (2), 1952 (71–86 + 5 photos). 10 refs.

905. *Forest Statistics and Resources*

See also Nos. 509, 989, 996, 1000.

1003. **A survey of agricultural, forestry, and fishery products in the United Kingdom and their utilisation, June 1951.** H.M. Stationery Office, London. 1953. pp. 141 + 3 maps. Price 7*s.* 6*d.*

Includes statistics for woodland area, timber production, timber imports, pulp imports, and wood waste; also peat and bracken.

1004. **Census of woodlands 1947–49. Woods of five acres and over: Scottish county details.** *Census Rep. For. Comm., Lond.* No. 4, 1953. pp. 187. Price 10*s.*

Supplementary to report No. 1. [Cf. *For. Abstr.* 14 (No. 2932).]

1005. **Hedgerow and park timber and woods under five acres 1951.** *Census Rep. For. Comm., Lond.* No. 2, 1953. pp. 88 + 11 photos + 1 map. Price 5*s.*

Supplements Census Report No. 1 (*Census of Woodlands of five acres and over*) [cf. *For. Abstr.* 14 (No. 2932)], and completes the survey of all the timber resources of Great Britain which was begun in 1947. The report contains the following sections: (1) Methods used in the survey; (2) Hedgerow and park timber (total volume, distribution by counties and by conservancies, classification by species and q.g.-class, number of trees, probable annual increment); (3) Small woods (area, classification, species composition, size and number); (4) Timber volume in 'unproductive' woodland (simple coppice, scrub, devasted woodland, felled woodlands).

Out of a total timber volume of 3,773 million cu. ft., 73% is in 'large woods' (5 acres and over), 6% in 'small woods' (1–5 acres), and no less than 21% in hedgerow and park trees. Thus over one-quarter of the country's timber is contained in small woods, park and hedgerow trees; nine-tenths of the coniferous timber, however, is in the large woods.

1006. **Forest resources of the Prince Albert Area of Saskatchewan.** *Forest Inventory Series, Department of Natural Resources, Saskatchewan* No. 2, 1953. pp. 32 + map.

1007. WRAY, R. D. **Forest statistics for West Virginia.** Northeastern Forest Experiment Station, Upper Darby, Pa. 1952. pp. 48. 3 refs. (*Forest Statistics Series: West Virginia* No. 1).

Gives tabulated data on land area and forest area, ownership, forest types, timber volume, timber quality, and growth and drain.

1008. Skogsvårdsarbetenas omfattning på bolagsjord i Sverige under perioden 1927–1951: en statistisk sammanställning. **[The extent of forest work carried out on company land in Sweden, 1927–51: a statistical review.]** *Cirkulär, Sveriges Skogsägareförbund, Stockholm* No. 4, 1952. pp. 11. [Sw.]

Tabulates figures showing the area and cost of thinnings, road building, preparatory methods for securing natural regeneration, and drainage during the period for the whole country and by counties.

907. *Indirect Significance of Forests (Rural Amenity, National Parks, Forest Influences etc.)*

See also Nos. 6, 14, 37 *et seq.*

1009. DJOEBER. Sambutan: pantjaguna hutan dimasa depan. **[Multiple use of forests in the future.]** *Rimba Indonesia* 2 (4), 1953 (174–7). [Jav.e.]

Makes recommendations for creating mixed forests, including food species for wild life, for stocking mountain rivers with fish, for reservation of some forests as recreation areas, for cultivating Bamboo and Rattan in old forests, and for planting trees with edible fruits, e.g. *Artocarpus* spp., *Pithecellobium* spp., *Durio* spp. and *Nephelium* spp. on cultivated ground owned by villages and communities.

1010. JOHNSON, F. W. **Forests and trout.** *J. For.* 51 (8), 1953 (551–4). 9 refs.

91. LAND USE, LAND-USE POLICY (INCLUDING AFFORESTATION POLICY)

1011. Mapa agronómico nacional. Pinares de la Meseta Sur del Duero (Castilla la Vieja). Hoja Num. 429. Navas de Oro (Segovia). Memoria. **[National land-use map. Pine stands of the plateau south of the Douro (Old Castile). No. 429, Navas de Oro (Segovia). Report.]** Ministerio de Agricultura, Madrid. 1951. pp. 245 + 58 photos + 10 maps + 9 dgms. + 2 gphs. [Span.]

A detailed report to accompany land-use maps published separately. The plateau lying between Valladolid, to the north, and Avila and Segovia to the south, is described, with information on topography, hydrology, climate, geology, soils and natural vegetation. The Pine (*Pinus pinaster* and *P. pinea*) stands are treated in detail, with an account of the resin-tapping industry in *P. pinaster* stands here and in Spain generally. A part of the region described above, lying round Navas de Oro, is mapped on a larger scale and land-use analysed in greater detail; this part of the report includes a section on the forests and forest products, and forest industries.

93. PUBLIC SUPERVISION AND REGULATION OF FORESTRY, INCLUDING LEGISLATION FOR THESE PURPOSES

See also No. 992.

1012. OHSAKI, R. **[Method of compensation, under Japanese forest law, for loss due to the conversion of private forest to protected forest.]** *For. [industr.] Econ., Tokyo* 6 (2), 1953 (1–16). [Jap.]

1013. HUGUET, L. **Unidades industriales de explotación forestal: a system of organized forest exploitation practised in Mexico.** *Unasylva* 7 (2), 1953 (50–4).

The Mexican forest law of 1948, Article 13, authorizes the setting up by presidential decree of

'Unidades industriales de explotación forestal', in both public and private forests, with the object of supplying the raw material necessary for the wood-using industries in the public interest. When such a 'Unidad' is created, the area concerned is placed under the technical jurisdiction of the State. In principle, any decision as to fellings no longer rests with the owners; the State decrees the time, place, method and extent of cutting. With these exceptions, the owner retains all privileges inherent in property rights. A 'Unidad' is created only when the needs of a particular industry demand it, and after the production of detailed plans. A recent Government circular compels 'Unidades industriales' to invest at least Mex. $600,000 (U.S. $65,000) apart from moneys required for road building. The forest engineer in charge of the 'Unidad' is appointed, housed, and paid by the industrial undertaking, but he receives his instructions from the National Forest Service and remains a civil servant. The management plan which he draws up must be approved by the Forest Service. Eight 'Unidades' have so far been formed in Mexico, 3 of them, covering a total area of 400,000 ha., to supply paper mills. There are 2 in tropical forests, covering 1,600,000 ha., one of which produces mainly Mahogany sawn timber, the other Cedar (*Cedrela odorata*) plywood. A detailed account is given of the Ciudad Guzman (Jalisco) 'Unidad'; it comprises 130,000 ha. of forest, mostly Pine, divided among more than 1000 owners.

94. OTHER METHODS TO IMPLEMENT FOREST POLICY

See also No. 1013.

945.3. *Education. Training*

1014. BARRETT, J. W. **The role of the humanities and other liberal courses in the professional forestry curriculum.** *J. For.* 51 (8), 1953 (574–8).

Extract from an unpublished thesis, based on 700 answers to a questionnaire from practising foresters, indicating the relative importance they attached to 57 possible 'courses' in a forestry school curriculum. The 12 subjects rated lowest include forest genetics, chemistry, entomology, internal combustion engines, and—last of all—foreign languages.

1015. BLENIS, H. W. **The rôle of forest ranger schools in Canada and the United States.** *For. Chron.* 29 (2), 1953 (158–72). 10 refs.

1016. KATAYAMA, S. **[Development and some problems of forest education in Japan.]** *For. [industr.] Econ., Tokyo* 6 (5; 6), 1953 (24–9; 25–35). [Jap.]

An historical survey.

945.4. *Research*

See also Nos. 92–4, 98, 184, 304, 521, 898, 968.

1017. **Research in forestry and forest products: a world directory of research institutions with the objectives and summary of their activities.** *FAO For. For. Prod. Stud.* No. 9, 1953. pp. 323. Price U.S. $3·00 or 15*s*.

Prepared in co-operation with the International Union of Forest Research Organizations. Arranged (1) in alphabetical order of countries and (2) under countries, by subjects. There is a subject index to the whole directory.

1018. WECK, J., and KOLLMANN, F. Investigaciones forestales en la República Federal Alemana. **[Forestry research in the Federal German Republic.]** *Montes, Madrid* 11 (51), 1953 (224–34). [Span.]

Notes on organization and work in progress in forestry and forest products research.

1019. GILKISON, D. N. **Workers in subjects pertaining to agriculture in land-grant colleges and experiment stations.** *Agric. Handb. U.S. Dep. Agric.* No. 50, 1953. pp. 225. E.M.B.

Includes forestry workers.

946.2. *Conferences and Excursions*

See Nos. 46, 57, 802.

95. FOREST TAXATION

See also Nos. 580, 582.

1020. BENSON, J. L. **Woodland taxation in England and Wales.** *Quart. J. For.* 47 (3), 1953 (193–8).

The ownership and occupation of woodlands in England and Wales are taxed differently from the ownership, occupation of, and profit arising from, other property, this difference having been deliberately contrived to allow for the long-term planning required in forestry and for the big wait which must occur between investment and profit. The methods of assessing taxes on woodlands in private ownership and occupation, and the reliefs that are admissible, are discussed and described. The subject is treated under 3 main heads—income tax, death duties, and sundry taxes and reliefs. *From author's summary.*

1021. MARQUIS, R. W. **Forest yield taxes.** *Circ. U.S. Dep. Agric.* No. 899, 1952. pp. 50.

Discusses forest yield taxes in several States of the U.S.A., the classification of land for this purpose, and the general principles on which such taxes should be based.

1022. ZUMWALT, E. V. **Taxation and other factors affecting private forestry in Connecticut.** *Bull. Yale Sch. For.* No. 58, 1953. pp. 134. 147 refs.

Mainly an account of forest taxation.

96. FOREST LABOUR QUESTIONS. LABOUR QUESTIONS IN WOOD TRANSPORT AND THE WOOD INDUSTRIES

1023. EVERS, K. Die Werkzeugkasse. **[The savings account for tools.]** *Forstarchiv* 23 (5/6), 1952 (108–10). [G.]

An allowance towards workers' tools and equipment is usually included with wages in Germany, and so tends to be absorbed into the workers household instead of encouraging the purchase of better tools. During wage negotiations in autumn 1951 the forest administrations of Württemberg and

N. Baden therefore proposed that such allowances should be paid into a special savings account in charge of the worker's representatives, viz. a foreman and a trusted worker, and that, on the other hand, payment should be made only for purchases of tools and equipment approved by the forest office. Both workers and employers agreed on this plan, and a brief indication is given of the content of the official agreement, incorporated into the Württemberg forest labour regulations. As the amounts paid in by the management on behalf of the workers (2% of loggers' wages, 1% of wages for silvicultural and roadbuilding work) cannot cover all requirements, special *ad hoc* grants are also made for certain items of equipment which the management regards as especially desirable. The scheme was introduced without friction and is working well. A list is appended of approved types of tools and equipment, indicating the proportion of the cost met by special grants, where applicable. Such grants are liable to alteration from year to year.

97. INTERNATIONAL FOREST POLICY AND OTHER INTERNATIONAL COLLABORATION

971. *Congresses. Conferences*

See also No. 897.

1024. **Report of the Near East Forestry Conference, Amman, Jordan, 13–20 December 1952.** FAO, Rome. 1953. pp. 32.

Includes the recommendations of the Conference but not papers or statements.

References: 1. *Cellulosa e Carta*, Rome; 2. *Conservation in the Americas*, Washington; 3. *FAO Publication*, Rome; 4. *Hungarian News and Information Service*, London; 5. *Italia Forestale e Montana*, Rome; 6. *Journal of Forestry*, Washington; 7. *Liverpool Daily Post*, Liverpool; 8. *Nature*, London; 9. *New Commonwealth*, London; 10. *N.R.C. Research News*, Ottawa; 11. *Otechestven Front*, Sofia; 12. *Pakistan Journal of Forestry*, Abbottabad; 13. *Report of the Victoria Commission*, Melbourne; 14. *Report of the Quebec Department of Lands and Forests*, Quebec; 15. *Report of the Queensland Minister of Lands and Forests*, Brisbane; 16. *Scottish Forestry*, Edinburgh; 17. *Southern Lumberman*, Nashville, Tenn.; 18. *TDA Press Leaflet*, London; 19. *Timber of Canada*, Ottawa; 20. *Timber Trades Journal*, London; 21. *Timberman*, Portland, Ore.; 22. *Times*, London; 23. *Trade leaflet*.

International.

FAO. Thirty-seven member countries have signed the International Plant Protection Convention which was approved by the FAO Conference at its 6th Session in Rome, 1951, and most of them have indicated their readiness to participate in the World Reporting Service for circulating information on the incidence of plant pests and diseases of economic importance in different countries, on the degree of damage they cause, and on their control (**3**; Aug. 1953).

Other bodies: The following conferences have been arranged:

16–18 Sept. Salzburg. International Union for the Protection of Nature.

26–31 Oct. Belgian Congo. C.C.T.A. Conference for the Protection of Flora and Fauna.

7 Nov. Montpellier. UNESCO symposium on Plant Ecology (arid zones).

16–21 Nov. British W. Africa. 2nd Meeting of the West Africa Committee for the Conservation and Utilization of the Soil.

Dec. British W. Africa. East and Central African Conference on Hydrology and Water Resources.

Australia. Following complaints by vine-growers in the Nyah district on the River Murray that Red Gum (*Eucalyptus rostrata*) forests in close proximity to the vineyards aggravated frost damage, the Victoria Forests Commission is co-operating with the Merbein Research Station of the C.S.I.R.O. to investigate the problem. As it is possible that the trouble is accentuated by stagnant air due to the adjacent forest stands, trial air-drainage lanes have been cut through the forest, and the effect of these is now being studied (**13**; 1952).

Bulgaria. Last year over a million dekares of forest were infested by larvae of *Lymantria dispar* and *Malacosoma neustria* and by grasshoppers. The pest-control campaign in spring 1953 failed to cover the whole affected area and half a million dekares of Oak forest have again been infested (**11**; 1953).

Canada. Dr. P. M. Laughton and Dr. D. C. Mortimer of the Division of Applied Biology, National Research Council of Canada, have found that plants can change the CO_2 of the air into solid cellulose in 10 seconds. Sugar-beet leaves were exposed to small amounts of radioactive CO_2 under a bright light for varying times and were then killed in boiling alcohol. Radioactive cellulose was found in the leaves even when they had absorbed the gas for only 10 seconds, and this must have been made from the labelled gas (**10**; Sept. 1953).

Research has been in progress at the Forest Products Laboratory at Duchesnay, Quebec province, to discover a method of manufacturing hardboard from woodwaste that would be economic as well as efficient. Work has been along the lines of a combination of the advantages of both wet and dry processes. By a radical modification of the technique of applying the synthetic adhesives, by means of a "half-dry" process, it was found possible to obtain panels of good stability at ordinary manufacturing speeds. The material was ordinary sawdust and chips with the addition of only 2–3% synthetic-resin adhesive. The equipment required is conventional and the installation of a mill capable of converting 10–30 tons of waste/day would cost not much more than $250,000. The production cost of the panels would be 4–5 cents/sq. ft. ($\frac{1}{2}$-in. thick). Tests of the finished material showed that its resistance to breakage is not only superior to that of ordinary insulation board of the same thickness, but also to that of natural woods usually used in building. Its superiority is equally marked in dimensional stability (**14**; 1952).

Colombia. The executive committee on natural resources of the Sociedad de Agricultores de Colombia has asked the Government to exempt from all municipal, state, and federal taxes, land planted with trees for the production of timber or as permanent forest, and income derived from it (**2**; 1953).

Denmark. The A/S Junckers Träkemi has succeeded in manufacturing acceptable newsprint, using only Beechwood sawmill waste (**1**; July 1953).

Great Britain. The newly formed Flintshire Woodland Society, set up to tackle the problem of 3000 acres of derelict copses in the county, now has about 750 acres of woodland in its charge. Work done during its first 10 weeks includes: weeding 30 acres of existing young plantations; clearing 12 acres of scrub ready for planting with conifers in a few weeks' time; and thinning about 20 acres of woodland (**7**; 3.9.53).

Messrs. Whitlock Bros., Ltd. of Great Yeldham, Suffolk, are now producing an improved model of the "Dinkum Digger" Trench Excavator. When mounted on Fordson Major or Ferguson tractors it is capable of digging trenches 10–30 in. wide with a maximum depth of 8 ft., and of loading the spoil direct into lorries. Various attachments are available, e.g. a range of buckets with detachable teeth and wing plates and automatic ejectors, jibs, grapple forks, and an all-weather operator's cab (**23**; 1953).

The order removing all restrictions on the acquisition, supply, and use of softwoods takes effect from 13 Nov. It is entitled the Timber (Control) (Revocation) Order 1953. It is estimated that the removal of these controls on softwoods will render unnecessary the filling up of more than 500,000 forms a year by users of timber (**22**; 13.11.53).

In reply to a question in the House of Commons on Oct. 29, the Minister of Agriculture stated that he and the Secretary of State for Scotland have set up a committee to advise on the problems arising in connexion with myxomatosis in rabbits and the action that should be taken by the Government. He added that all reasonably practicable steps are being taken to stamp out the only two known outbreaks of the disease, which have lately come to light in Kent. Measures are also being examined for the protective inoculation of tame rabbits in case myxomatosis should spread. Future policy will be determined in the light of recommendations from the advisory committee, which is meeting immediately (**8**; 7.11.53).

Great interest was aroused at the Highland Show at Alloa by the Transportable Log Band Saw, type VXJ, exhibited by Messrs. Stenners of Tiverton. The sawyer operating the machine had never previously worked a band saw. The cutting of various sizes of Larch, Spruce and Oak was carried out without a hitch, and the speed with which the machine could be set up and packed up again was timed with a stop-watch. From the time the machine left the road, to having it fixed up and running, took 23 minutes, and to pack it up and have it back on the road took 18 minutes (**16**; Oct. 1953).

A Dutch barn incorporating the T.D.A.'s new rigid-frame system of construction has been erected on the Chatsworth Estate, Chesterfield, and has undergone a number of tests. It has a 30-ft. clear span, is 18 ft. to the eaves and has 4 bays of 15-ft. each (**18**; 6.10.53).

The first "Bartrev" press for the continuous manufacture of high-quality chipboard has just gone into production at Mark's Tey, Essex. The manufacturers (The Vere Engineering Co., Ltd.) hope to build a further 36 of these presses in the course of the next 2 years. The machine manufactures a continuous strip of board, 4 ft. wide in thicknesses from $\frac{3}{16}$ to $\frac{3}{4}$ in., at speeds up to 30 ft./min. The press consists of 4 main parts—feeding unit, H.F. heating unit, the press itself, and an automatic saw. It has an over-all length of 134 ft., is 7 ft. 6 in. wide and 20 ft. high and weighs 200 tons. Only 3 men are needed to run it (**19**; Aug. 1953).

Railway sleepers of Western Hemlock are being tested under typical conditions in the London, Midlands, and Scottish Regions of British Railways to determine the most suitable methods of treating the wood (**20**; 5.9.53).

Relics of the Roman occupation of Britain found in deep excavations in London, on the corner of Queen Street and Queen Victoria Street, included a ladder about 8 ft. long with rungs 20 in. apart, efficiently mortised and tenoned, a barrel and a cup. The ladder was identified as Oak (*Quercus* sp.) dating from about 75 A.D., the cup is boxwood (*Buxus* sp.) and the barrel Fir (*Abies* sp.). All were in excellent condition (**20**; 7.11.53).

Hungary. The afforestation plans for the current planting season include the planting of 83 million trees, of which 8 million will be Pines. Experiments are in progress on the crossing of quick-growing native Poplars with exotic Poplars of better form (**4**; 8.9.53).

India. A Desert Afforestation Research Station has been established at Jodhpur by the Government of India. It will be under the direction of the Forest Research Institute, Dehra Dun and will study: (1) the ecology and silviculture of species already growing in the Rajasthan desert; (2) the possibility of introducing exotic species such as *Prosopis juliflora*, *Agave* sp. etc.; (3) edaphic factors, especially air-borne salt contents and the effect of minute traces of salts on moisture retentivity of freshly deposited sands; (4) hydrological conditions; (5) rainfall; and (6) wind velocity and the nature of aeolian deposits.

In addition to research, the station will demonstrate methods of desert control by: (*a*) creating oases of vegetation; (*b*) creating a 5-mile-wide forest belt on the western border of Rajasthan, against wind-blown sand from Sind; (*c*) establishing shelterbelts along selected roads and railways running transversely to the direction of prevailing winds; (*d*) running a nursery at Jodhpur; (*e*) running a publicity campaign (**12**; July 1953).

Israel. A pilot plant for the impregnation of freshly felled *Eucalyptus* poles by a modified Boucherie process has been set up by the Forest Research Institute. A Masonite factory in the Jordan valley is about to start production; it will utilize wood waste from a neighbouring plywood factory (**3**; 26.8.53).

Italy. The Italian Packaging Institute has set up a research centre (Centro Sperimentale per l'Imballaggio) at the University of Padua (**5**; July/Aug. 1953).

Pakistan. An engineer from the U.S. Forest Products Laboratory, Madison, is helping to prepare designs for a new forest products laboratory to be established at Chittagong under the Point 4 programme. The laboratory, which will cover about 10,000 sq. ft., will include a wood-preserving plant. kiln-drying facilities, equipment for testing physical and mechanical properties of different species, machinery for producing composite woods, and some equipment for wood chemistry (**17**; 15.10.53),

Samoa. Considerable importance is attached to the discovery in Western Samoa of a type of Cacao that not only yields more and richer pods than the normal tree, but is said to be disease-resistant. It is a hybrid of two standard varieties and over a period of years has proved resistant to black pod disease (**9**; 3.8.53).

Siam. It is understood that the ban on the export of Yang [*Dipterocarpus tuberculatus*] and some other hardwoods from Siam, which has been in operation for some 3 years, has recently been lifted (**20**; 12.9.53).

Sweden. The HB beam system, invented by Prof. Hilding Brosenius, consists of two long glue-laminated members which act as flanges, and a lumber web fastened together by a special nailing technique. It has been used extensively for aircraft hangars, etc. (e.g. the KLM hangar at Amsterdam) in Europe and is now being introduced into Canada. The web of the beam consists of short pieces of lumber of two thicknesses running diagonally to the flanges in two directions, and fastened to the flanges with long wire nails. It is particularly suited to spans of over 35 ft. (**19**; Aug. 1953).

Tropical America. The Sociedad Dasonomica de la América Tropical, founded in Dec. 1952, is designed to promote closer relations between foresters of tropical America, exchange of information, and improvement in the status of the profession of forestry. Further information may be obtained from the Secretary, Ing. G. Budowski, c/o Ministerio de Agricultura, Havana, Cuba (**2**; 1953).

U.S.A. In laboratory tests at the Western Washington Experiment Station, high-frequency radio waves have been used to sterilize soils against damping-off fungi, and to kill various fungi attacking wood and trees. To kill dry rot and other fungi of building timbers, electrodes were set 1-in. apart and a frequency of 8 megacycles with a current of nearly 4 amp. was passed through pure cellulose discs on which the cultures had been grown. A 10-min. exposure was needed to kill 132-day-old cultures and 4-min. for 42-day-old cultures. Electrodes were set 2 in. apart and a frequency of 2·7 megacycles with a current of 3 amp. and 3600 volts was passed through culture blocks of Douglas Fir to kill fungi causin g root and stem rot of conifers, and dry rot. Various exposures, all below 12 min., killed both types of fungus (**21**; Nov. 1953).

A prolonged drought, coupled with thunderstorms, combined to make a one-week period in August the worst on record for forest fires in the far west, with more than 1500 reported during a single week in Montana, Idaho, California, Washington, and Oregon. In California alone 197 lightning fires were reported on one day and 137 the next (**6**; Oct. 1953).

The "Hydra-Wedge" a new hydraulic wedge for felling trees made by the Hufford Machine Works Inc., El Segundo, California, has been tested recently. The unit consists of a hand-operated hydraulic pump, a power cylinder and a tapered wedge attached to the end of a piston rod. The wedge is

sheathed on each side by two thin blades hinged to the main cylinder casting. These blades are inserted in the saw kerf in the trunk, and pumping the handle forces the wedge between the blades and gives lifting forces up to 90,000 lb. The equipment weighs 20 lb. and is 24 in. long. All tree shock is eliminated, risk of injury from falling branches is reduced and control of the direction of the fall is improved (**17**; 15.9.53).

Wood only $\frac{1}{200}$ in. thick, which can be pasted to walls like wallpaper, was shown at a recent New York exhibition. Invented in Europe this "Microwood" is now being introduced into the U.S.A. It consists of a finely shaven layer of wood with a thin paper backing. It bends readily, is of high tensile strength and can be stamped, printed, lacquered, varnished, waxed, oiled, punched, ground, and polished, either by machine or by hand. It can be fixed with ordinary adhesives to various surfaces, including low-grade wood, paper-board, and metal, and is available in 10 African and European woods, in rolls of standard widths and lengths (**19**; Aug. 1953).

Pres-to-logs which burn with a coloured flame are being produced by Weyerhaeuser Timber Co. They are identical in size and appearance with the regular Pres-to-log [cf. *For. Abstr.* 6 (110)] but contain a chemical added when mixing the dry sawdust and shavings before they are compressed (**21**; Sept. 1953).